PROJECT MANUAL

GOODWIN HALL-RENOVATION
AND
BAND REHEARSAL HALL ADDITION

AU Project Number : 15-255

ABC Job Number: 2017-123

Date : JUNE 14, 2017

AUBURN

UNIVERSITY

FACILITIES DIVISION
SAMFORD AVENUE
AUBURN UNIVERSITY, ALABAMA 36849-5515
PHONE: 334.844.9450 FAX: 334.844.9458

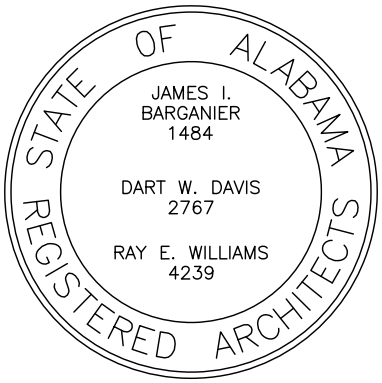
PROJECT TEAM

GOODWIN-HALL RENOVATION
AND
BAND REHEARSAL HALL ADDITION

AU PROJECT NUMBER: 15-255
ABC JOB NUMBER: 2017-123

BDS PROJECT NUMBER: 16-111

JUNE 14, 2017



CIVIL ENGINEER:

LBYD CIVIL AND STRUCTURAL ENGINEERS
716 SOUTH 30TH STREET
BIRMINGHAM, AL 35233
PHONE: (205) 251-4500
FAX: (205) 488-0226
EMAIL: CEATMAN@LBYD.COM

MECHANICAL/PLUMBING ENGINEER:

CONWAY & OWENS
110 SOUTH COLLEGE STREET, SUITE 203
AUBURN, AL 36832
PHONE (334) 626-8858
EMAIL: JSHAFFER@CONWAY-OWEN.COM

STRUCTURAL ENGINEER:

BLACKBURN DANIELS O'BARR
8805 COUNTY ROAD 40E
LOWDNESBORO, AL 36752
PHONE: (334) 265-0206
ATTEN: JACK DANIELS

ELECTRICAL ENGINEER:

CONWAY & OWENS
110 SOUTH COLLEGE STREET, SUITE 203
AUBURN, AL 36832
PHONE (334) 626-8858
EMAIL: JSHAFFER@CONWAY-OWEN.COM

Barganier
Davis
Sims
Architects
Associated
AIA

624 South McDonough St.
Montgomery, Alabama 36104
Phone: (334) 834-2038
Fax: (334) 834-1037

SET # _____

INDEX TO SPECIFICATIONS

Goodwin Hall Renovations and Band Rehearsal Hall Additions
Auburn University

AU Project No. 15- 255

BDS PROJECT NO. 2016-111

BIDDING REQUIREMENTS

a. Administrative Rule 107 - x -8, ABC Memo, September 29, 2014

b. Exemption from Sales and Tax, ACT 2013-205, ABC Memo, October 28, 2013

c. Certification of Fire Alarm Contractors, ABC Memo, July 17, 2012

d. Additional Guidance Alabama Immigration Law ACT 2011-535, ABC Memo, January 11, 2012

e. Guidance Amending Alabama Immigration Law ACT 2012-491, ABC Memo, May 29, 2012

Section 00 1600 AU Supplemental Conditions of the Project AU Form C-18, November 2015

DIVISION 1 - GENERAL REQUIREMENTS

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Section 012200 - Unit Prices
Section 012300 - Alternates
Section 013100 - Project Management and Coordination
Section 013300 - Submittal Procedures
Section 015000 - Temporary Facilities and Controls
Section 016000 - Product Requirements
Section 017329 - Cutting and Patching
Section 017700 - Closeout Procedures
Section 017823 - Operation and Maintenance Data
Section 017839 - Project Record Documents
Section 017900 - Demonstration and Training

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Section 024119 - Selective Structure Demolition
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DIVISION 3 - CONCRETE

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Section 055213 - Pipe and Tube Railings

DIVISION 6 – CARPENTRY

DIVISION 7 - MOISTURE PROTECTION

DIVISION 8 - DOORS, WINDOWS AND GLASS

DIVISION 9 - FINISHES

DIVISION 10 – SPECIALTIES

DIVISION 11 - EQUIPMENT

N/A

DIVISION 12 - FURNISHINGS

DIVISION 13 - SPECIAL CONSTRUCTION

N/A

DIVISION 14 - CONVEYING SYSTEMS

N/A

DIVISION 21- FIRE PROTECTION

DIVISION 22- PLUMBING

DIVISION 23- HEATING VENTILATION AND AIR CONDITIONING

DIVISION 26 - ELECTRICAL

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

DIVISION 31 – EARTHWORK

DIVISION 32 – EXTERIOR IMPROVEMENTS

DIVISION 33 – UTILITIES

END OF SECTION

ADVERTISEMENT FOR BID

Sealed proposals will be received from pre-qualified bidders by **Mr. Walker Davis** on behalf of Dr. G. Jay Gogue, President of Auburn University at 1161 West Samford Avenue, Auburn University, AL 36849 until 3:00 PM Central Time, **July 06, 2017** for:

15-255 - Goodwin Hall - Renovation & Band Rehearsal Hall Addition

AUBURN UNIVERSITY

at which time and place they will be publicly opened and read in **Facilities Management Building One, Training Room A.**

A. SCOPE OF WORK:
The general scope of the work includes but is not limited to:

The Goodwin Hall - Renovation & Band Rehearsal Hall Addition project will construct a double height rehearsal hall with basement. The 14,500 SF+/- building will consist of a band rehearsal hall, instrument/uniform storage rooms and support space. This project will also include some renovations to the existing Goodwin Hall building.

The Pre-Bid Conference will be held on June 21, 2017 at 9:00 A.M. CST at the Facilities Management Building One, AVP Meeting Room, Auburn University, Auburn, Alabama 36849.

For prequalification or additional info, please contact:
David Bess, bessdav@auburn.edu; 334-734-0946

B. DOCUMENTS:

Drawings may be examined at the following locations:
Bid Documents will be available June 14, 2017. Prime Contractor pre-qualification required. **Please submit AU pre-qualification responses no later than June 21, 2017.**

Auburn University Website:
https://sites.auburn.edu/admin/facilities/bidcalendar/Lists/Calendar/calendar.aspx

BONDS:
A certified check or bid bond payable to Auburn University in an amount not less than five percent (5%) of the amount of the bid, but in no event more than $10,000.00, must accompany the bidder's proposal. Performance and Statutory Labor and Material Payment Bonds will be required at the signing of the Contract.

BIDS:
Bids must be submitted on proposal forms or copies thereof furnished by the Architect.

Dr. G. Jay Gogue, President
Auburn University
Auburn University, AL 36849

END

Dates of Advertisement:

Opelika-Auburn News:	**April 09, 2017**
Birmingham News:	**April 16, 2017**
Mobile Register:	**April 16, 2017**
Montgomery Advertiser:	**April 16, 2017**

BOT PREQUALIFICATION CERTIFICATION

AUBURN UNIVERSITY PROJECT NUMBER: 15-255

PROJECT NAME: Goodwin Hall - Renovation & Band Rehearsal Hall Addition

AUBURN UNIVERSITY PROJECT LEAD THROUGH BIDDING: David Bess

DEADLINE TO COMPLETE QUESTIONNAIRE: June 21, 2017

PROJECT OR BID PACKAGE DESCRIPTION:

The Goodwin Hall - Renovation & Band Rehearsal Hall Addition project will construct a two- story, 14,600 square foot building consisting of a band rehearsal hall, instrument/uniform storage rooms and support space. This project will also include minor renovations to the existing Goodwin Hall building. The project will provide an indoor practice and storage space for all of the Auburn University Bands within the Department of Music.

Bid documents are scheduled to be posted **June 14, 2017**. Prime contractor prequalification is required.

Drawings and specifications may be examined at the Office of the Owner: Facilities Design and Construction Services, Facilities Management, Auburn University, AL. Drawings and specifications can also be found online at the Auburn University Website:

https://sites.auburn.edu/admin/facilities/bidcalendar/Lists/Calendar/calendar.aspx

Before proceeding with the questionnaire below, your contractor registration information must be reviewed and/or edited for accuracy. Once your review and/or edit is complete, you must save/confirm the data. Once saved/confirmed, you will be allowed to proceed with the project specific pre-qualification questionnaire below. Any correspondence regarding this questionnaire will be emailed to the email address provided with the applicant's Part V submittals.

All information provided by the applicant is subject to verification. Auburn University reserves the right to revoke the applicant's prequalification approval or consider a bid nonresponsive, per The Code of Alabama 1975, Title 39, and Section 39-2-4c and d, if it is determined that incorrect information was provided by a bidder in order to prequalify for this project.

This form must be electronically signed by a person legally authorized to sign contract documents for the firm requesting prequalification.

I. DEFINITIONS/CLARIFICATIONS:

A. **Claims or Disputes:** Per the Alabama Building Commission General Conditions, Article 24, a claim or dispute is defined as follows.

"As used in this Article, "Claims and Disputes" include claims or disputes asserted by the Contractor, its Surety, or Owner arising out of or related to the Contract, or its breach, including without limitation claims seeking, under the provisions of the Contract, equitable adjustment of the Contract Sum or Contract Time and claims and disputes arising between the Contractor (or its Surety) and Owner regarding interpretation of the Contract Documents, performance of the Work, or breach of or compliance with the terms of the Contract."

B. **Public Works:** The construction, installation, repair, renovation, or maintenance of public buildings, structures, sewers, waterworks, roads, curbs, gutters, side walls, bridges, docks, underpasses, and viaducts as well as any other improvement to be constructed, installed, repaired, renovated, or maintained on public property and to be paid, in whole or in part, with public funds or with financing to be retired with public funds in the form of lease payments or otherwise.
C. **Completed Project:** Achieving substantial completion as evidenced by certificate from owner.
D. **Firms with more than one office:** All information requested in this questionnaire must be provided for the branch that will manage this project.
E. **Length of Time:** When any question is asking for a length of time, such as years of experience, it is referring to time from the scheduled bid date.
F. **Changing Proposed Project Team Members:** Contractors are allowed to request changing proposed project team members up to 10 calendar days before bid. This request must be in writing and be accompanied by all required documentation, along with a signed statement confirming that all responses provided in the original prequalification are still "True" for proposed new personnel. This request, with submittal/documentation must be received by David Bess at bessdav@auburn.edu no later than 10 calendar days before the scheduled bid date.
G. **Appeals Process for not being approved as a pre-qualified contractor:** All appeals must be received in writing by David Bess at bessdav@auburn.edu within 5 calendar days after being denied prequalification. The appeal should clearly state the grounds for appeal and include any necessary documentation. Auburn University will review the appeal and provide a final decision within 3 days of appeal submission.
H. **Correspondence from Auburn University or its Agent regarding prequalification status or appeals:** All such correspondence will be sent to the primary and secondary contacts provided.
I. **Backlog Under Contract:** The total of the unbilled amounts on all current contracts.

II. MANDATORY REQUIREMENTS:

REQUIREMENTS: **Applicant must respond "True" or "False" for a – s below.** (If the applicant cannot answer "True" for all items in this section, its application for prequalification to bid on this project will be denied.)

A. Applicant has completed the Auburn University contractor registration process and received approval of such. (True/False)
B. Applicant's Alabama General Contractor's License includes BC classification. (True/False)
C. Applicant's Alabama General Contractor's License includes a bid limit of $6 million. (True/False)
D. Applicant has been in business under current name for at least five (5) years as of the scheduled bid date. (True/False)
E. Applicant's average annual revenue for the past five (5) years is at least $ 4 million. (True/False)

F. Applicant's backlog under contract is less than 150% of the its five (5) year average annual revenue. (True/False)
G. Applicant has reviewed and will comply with Auburn University's insurance requirements. (True/False) Follow link below: http://www.auburn.edu/administration/facilities/contractor-documents/
H. Applicant has reviewed and will comply with Auburn University's safety requirements. (True/False) Follow link below: http://www.auburn.edu/administration/facilities/contractor-documents/cs.html
I. The applicant's bonding company has a Best Rating of A- or better and a United States Treasury Limit at least equal to the estimated contract sum of this project. (True/False)
J. The applicant's surety firm has not completed any contract on the applicant's behalf, or paid for completion because the applicant was default terminated by a project owner within the last five (5) years. (True/False)
K. Applicant's owners or officers have not been convicted of a crime involving the awarding of a contract for any construction project, or for the bidding or performance of a construction contract within the last five (5) years. (True/False)
L. Applicant's surety firm has not made any payments on its behalf as a result of a default, to satisfy any claims made against a performance or payment bond issued on the applicant's behalf, in connection with any public or private construction project within the last five (5) years. (True/False)
M. Applicant has a Drug Free Workplace Program that complies with the State of Alabama requirements. (True/False)
N. The applicant, or any firm with which any of its owners, officers or partners was associated in a management role have not been debarred, disqualified, removed or otherwise prevented from bidding on, or completing, any government agency or public works project for any reason. (True/False)
O. Applicant does not have any current claims or disputes against Auburn University for a single project where the cumulative total equals or exceeds 5 % of the current contract amount. (True/False)
P. Applicant's firm has successfully completed 2 or more projects with similar or comparable scopes, as described at the beginning of this document, within the last ten (10) years. (True/False)
Q. Applicant's Project Manager has successfully completed 2 or more projects with similar or comparable scopes, as described at the beginning of this document, within the last ten (10) years while in this position (True/False)
R. Applicant's Superintendent will be full time for this project. (True/False)
S. Applicant's Superintendent has successfully completed 2 or more projects with similar or comparable scopes, as described at the beginning of this document, within the last ten (10) years while in this position. (True/False)

III. ADDITIONAL REQUIRED INFORMATION FOR CONSIDERATION

A: DISPUTES & SETTLEMENTS

REQUIREMENTS: Applicant must respond "True" or "False" for 1 – 3 below. A written explanation is mandatory for any "False" responses as part of the required submittals.

1. Applicant has not been assessed and paid liquidated damages after completion of a project under a construction contract with either a public or private owner within the last five (5) years. (True/False)
2. Applicant has not been denied an award of a public works contract based on a finding by a public agency that the firm was not a responsible bidder within the last five (5) years. (True/False)
3. Applicant has not been involved in any claims or settlements within the last five (5) years against project owners for completed or current projects where the cumulative total equaled or exceeded 5 % of the contract amount of the project involved. (True/False)

B: SAFETY

REQUIREMENTS: Applicant must respond "True" or "False" for 1 – 7 below. "NA" is acceptable for 1 or 2, depending on which one is not applicable to the applicant. A written explanation is mandatory for any "False" responses as part of the required submittals.

1. If applicant's firm has 50 employees or less, its TRIR is equal or less than 3.7. (True/False/NA)
2. If applicant's firm has more than 50 employees, its TRIR is equal or less than 2.6. (True/False/NA)
3. Applicant's Experience Modification Rate (EMR) is equal or less than 1.0. (Note: An EMR is issued to your firm annually by your workers' compensation insurance carrier.) (True/False)
4. Applicant has a corporate safety officer with at least 3 years of experience in this position. (True/False)
5. Applicant's proposed safety and health officer has at least 5 years of experience in this position and will visit the project site once a week (minimum) to inspect site conditions, individuals on-site, and enforce safety and health regulations. (True/False)
6. OSHA has not cited and assessed penalties against the applicant for any "serious", "willful", or "repeat" violations of its safety or health regulations within in the last five (5) years. (True/False)
7. The EPA, ADEM or another delegated agency have not cited and assessed penalties against the applicant or the owner of a project on which the applicant was the contractor within the last five (5) years. (True/False)

C: FIRM AND KEY PERSONNEL FIRM EXPERIENCE, PAST PERFORMANCE, and OTHER RELEVANT INFORMATION

REQUIREMENTS: Applicant must respond "True" or "False". A written explanation is mandatory for any "False" responses as part of the required submittals.

1. **FIRM:**
   a. Has successfully completed 2 public works projects within the last 10 years as a prime contractor with individual construction values equal to or greater than $ 2 million. (True/False)
   b. Has successfully completed 2 higher education projects within the last 10 years as a prime contractor with individual construction values equal to or greater than $ 2 million. (True/False)
2. **PROPOSED PROJECT MANAGER:**
   a. Has successfully managed and completed 2 public works projects with individual construction values equal to or greater than $2 million while in this position. (True/False)
   b. Has successfully managed and completed 2 higher education projects with individual construction values equal to or greater than $ 2 million while in this position. (True/False)
   c. Has worked for this firm, in this position, for 2 or more years. (True/False)
3. **PROPOSED SUPERINTENDENT:**
   a. Will not have any other duties other than supervision and QA/QC. (True/False)
   b. Has successfully managed and completed 2 public works projects with individual construction values equal to or greater than $2 million while in this position. (True/False)
   c. Has successfully managed and completed 2 higher education projects with individual construction values equal to or greater than $2 million while in this position. (True/False)
   d. Has worked for this firm, in this position, for 2 or more years. (True/False)

D: REQUIRED SUBMITTALS WITH THIS PREQUALIFICATION CERTIFICATION (Where project information is required, the applicant can use the same projects as backup documentation for multiple requirements. However, each project provided must clearly state what Part and response the information is being provided as documentation for.)

1. OSHA 300 and 300A Logs
2. Copy of Alabama General Contractor's License
3. Provide a primary and secondary point of contact along with their email addresses. All correspondence regarding this application will be sent by email to these two contacts.
4. Name of the firm, or firms, which prepared certified financial statements for the applicant for the previous five (5) years. Include address, contact name and phone number. The firm, or firms, must be authorized by the applicant to provide Auburn University or its agent verification of annual revenue.

5. Project Organizational Chart (must include a minimum of two levels above on-site project staff)
6. Proposed Project Team Resumes (Corporate Safety Officer, Project Manager, On-Site Safety & Health Officer and Superintendent)
7. List of Projects, on applicant's letter head, used to document Section II, requirements P, R and T. Include project name, description of work that documents similarity to this project, location, architect w/ contact name and phone number, owner w/ contact name and phone number plus the month and year of substantial completion.
8. List of Projects, on applicant's letter head, used to document Section III / C / 1 / a & b, Section III / C / 2 / a & b and Section III / C / 3/ b & c. Include project name, description of work that documents similarity to this project, location, architect w/ contact name and phone number, owner w/ contact name and phone number plus the month and year of substantial completion.
9. Letter from applicant's bonding company:
   a. Certifying that they have a Best Rating of A- or better, and a United States Treasury Limit at least equal to the contract sum of any projects they pre-qualify to bid on.
   b. Certifying the value of work currently under contract.
10. Statement on applicant's letter head certifying the following.
    a. Amount of work currently under contract, the year and month the firm was founded.
    b. Annual revenue for each of the five previous years.
11. Written explanation, on applicant's letter head, for any "False" responses for Sections II & III of this application.
12. Please provide the following information, on the applicant's letter head, for the applicant's five most recently completed projects with a construction value equal to or greater than $2 million.
13. Project name, location, architect w/ contact name and phone number, owner w/ contact name and phone number plus the month and year of substantial completion.

The company official signing below affirms that the information provided is current, accurate, true and sufficiently complete so as not to be misleading and that they are legally authorized to sign contract documents for the firm requesting this prequalification.

_____

(Electronic Signature)

INSTRUCTIONS TO BIDDERS

CONTENTS

1. BID DOCUMENTS

The Bid Documents consist of the Advertisement for Bids, these Instructions to Bidders, any modifications of or supplements to these Instructions to Bidders, the Proposal Form, and the proposed Contract Documents. The proposed Contract Documents consist of the Construction Contract, the Performance Bond and Payment Bond, the Conditions of the Contract (General, Supplemental, and other Conditions), Drawings, Specifications and all addenda issued prior to execution of the Construction Contract. Bid Documents may be obtained or examined as set forth in the Advertisement for Bids.

2. GENERAL CONTRACTOR'S STATE LICENSING REQUIREMENTS:

When the amount bid for a contract exceeds $50,000, the bidder must be licensed by the State Licensing Board for General Contractors and must show the Architect evidence of license before bidding or the bid will not be received by the Architect or considered by the Awarding Authority. A bid exceeding the bid limit stipulated in the bidder's license, or which is for work outside of the type or types of work stipulated in the bidder's license, will not be considered. In case of a joint venture of two or more contractors, the amount of the bid shall be within the maximum bid limitation as set by the State Licensing Board for General Contractors of the combined limitations of the partners to the joint venture.

3. QUALIFICATIONS of BIDDERS and PREQUALIFICATION PROCEDURES:

a. Any special qualifications required of general contractors, subcontractors, material suppliers, or fabricators are set forth in the Bid Documents.

b. The Awarding Authority may have elected to prequalify bidders. Parties interested in bidding for this contract are directed to the Advertisement for Bids and Supplemental Instructions to Bidders to determine whether bidders must be prequalified and how they may obtain copies of the Awarding Authority's published prequalification procedures and criteria.

c. Release of Bid Documents by the Architect to a prospective bidder will not constitute any determination by the Awarding Authority or Architect that the bidder has been found to be qualified, prequalified, or responsible.

4. PREFERENCE to RESIDENT CONTRACTORS:
(If this project is federally funded in whole or in part, this Article shall not apply.)

a. In awarding the Contract, preference will be given to Alabama resident contractors and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded the Contract only on the same basis as the nonresident bidder's state awards contracts to Alabama contractors bidding under similar circumstances.

b. A nonresident bidder is a contractor which is neither organized and existing under the laws of the State of Alabama, nor maintains its principal place of business in the State of Alabama. A nonresident contractor which has maintained a permanent office within the State of Alabama for at least five continuous years shall not thereafter be deemed to be a non-resident contractor so long as the contractor continues to maintain a branch office within Alabama.

5. EXAMINATION of BID DOCUMENTS and the SITE of the WORK :

Before submitting a bid for the Work, the bidders shall carefully examine the Bid Documents, visit the site, and satisfy themselves as to the nature and location of the Work, and the general and local conditions, including weather, the general character of the site or building, the character and extent of existing work within or adjacent to the site and any other work being performed thereon at the time of submission of their bids. They shall obtain full knowledge as to transportation, disposal, handling, and storage of materials, availability of water, electric power, and all other facilities in the area which will have a bearing on the performance of the Work for which they submit their bids. The submission of a bid shall constitute a representation by the bidder that the bidder has made such examination and visit and has judged for and satisfied himself or herself as to conditions to be encountered regarding the character, difficulties, quality, and quantities of work to be performed and the material and equipment to be furnished, and as to the contract requirements involved.

6. EXPLANATIONS and INTERPRETATIONS:

a. Should any bidder observe any ambiguity, discrepancy, omission, or error in the drawings and specifications, or in any other bid document, or be in doubt as to the intention and meaning of these documents, the bidder should immediately report such to the Architect and request clarification.

b. Clarification will be made only by written Addenda sent to all prospective bidders. Neither the Architect nor the Awarding Authority will be responsible in any manner for verbal answers or instructions regarding intent or meaning of the Bid Documents.

c. In the case of inconsistency between drawings and specifications or within either document, a bidder will be deemed to have included in its bid the better quality or greater quantity of the work involved unless the bidder asked for and obtained the Architect's written clarification of the requirements before submission of a bid.

7. SUBSTITUTIONS

a. The identification of any product, material, system, item of equipment, or service in the Bid Documents by reference to a trade name, manufacturer's name, model number, etc. (hereinafter referred to as "source"), is intended to establish a required standard of performance, design, and quality and is not intended to limit competition unless the provisions of paragraph "d" below apply.

b. When the Bid Documents identify only one or two sources, or three or more sources followed by "or approved equal" or similar wording, the bidder's proposal may be based on a source not identified but considered by the bidder to be equal to the standard of performance, design and quality as specified; however, such substitutions must ultimately be approved by the Architect. If the bidder elects to bid on a substitution without "Pre-bid Approval" as described below, then it will be understood that proof of compliance with specified requirements is the exclusive responsibility of the bidder.

c. When the Bid Documents identify three or more sources and the list of sources is not followed by "or approved equal" or similar wording, the bidder's proposal shall be based upon one of the identified sources, unless the bidder obtains "Pre-bid Approval" of another source as described below. Under these conditions it will be expressly understood that no product, material, system, item of equipment, or service that is not identified in the Bid Documents or granted "Pre-Bid Approval" will be incorporated into the Work unless such substitution is authorized and agreed upon through a Contract Change Order.

d. If the Bid Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the bidder's proposal must be based upon the identified sole source.

e. Procedures for "Pre-bid Approval". If it is desired that a product, material, system, piece of equipment, or service from a source different from those sources identified in the Bid Documents be approved as an acceptable source, application for the approval of such source must reach the hands of the Architect at least ten days prior to the date set for the opening of bids. At the Architect's discretion, this ten day provision may be waived. The application for approval of a proposed source must be accompanied by technical data which the applicant desires to submit in support of the application. The Architect will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed source with previous users, evidence of reputation of the source for prompt delivery, evidence of reputation of the source for efficiency in servicing its products, or any other pertinent written information. The application to the Architect for approval of a proposed source must be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Bid Documents. The burden of proof of the merit of the proposed substitution is upon the proposer. To be approved, a proposed source must also meet or exceed all express requirements of the Bid Documents. Approval, if granted, shall not be effective until published by the Architect in an addendum to the Bid Documents.

8. PREPARATION and DELIVERY of BIDS:

a. Proposal Form:

(1) Bids must be submitted on the Proposal Form as contained in the Bid Documents; only one copy is required to be submitted.

(2) All information requested of the bidder on the Proposal Form must be filled in. The form must be completed by typewriter or hand-printed in ink.

(3) Identification of Bidder: On the first page of the Proposal Form the bidder must be fully identified by completing the spaces provided for:

- **(a)** the legal name of the bidder,
- **(b)** the state under which laws the bidder's business is organized and existing,
- **(c)** the city (and state) in which the bidder has its principal offices,
- **(d)** the bidder's business organization, i.e., corporation, partnership, or individual (to be indicated by marking the applicable box and writing in the type of organization if it is not one of those listed), and
- **(e)** the partners or officers of the bidder's organization, if the bidder is other than an individual. If the space provided on the Proposal Form is not adequate for this listing, the bidder may insert "See Attachment" in this space and provide the listing on an attachment to the Proposal Form.

(4) Where indicated by the format of the Proposal Form, the bidder must specify lump sum prices in both words and figures. In case of discrepancy between the prices shown in words and in figures, the words will govern.

(5) All bid items requested in the Proposal Form, including alternate bid prices and unit prices for separate items of the Work, must be bid. If a gross sum of bid items is requested in the Proposal Form, the gross sum shall be provided by the bidder.

(6) In the space provided in the Proposal Form under "Bidder's Alabama License", the bidder must insert his or her current general contractor's state license number, current bid limit, and type(s) of work for which bidder is licensed.

(7) The Proposal Form shall be properly signed by the bidder. If the bidder is:

- **(a) an individual**, that individual or his or her "authorized representative" must sign the Proposal Form;
- **(b) a partnership,** the Proposal Form must be signed by one of the partners or an "authorized representative" of the Partnership;
- **(c) a corporation,** the president, vice-president, secretary, or "authorized representative" of the corporation shall sign and affix the corporate seal to the Proposal Form.

As used in these Instructions to Bidders, "authorized representative" is defined as a person to whom the bidder has granted written authority to conduct business in the bidder's behalf by signing and/or modifying the bid. Such written authority shall be

signed by the bidder (the individual proprietor, or a member of the Partnership, or an officer of the Corporation) and shall be attached to the Proposal Form.

(8) Interlineation, alterations or erasures on the Proposal Form must be initialed by the bidder or its "authorized representative".

b. Bid Guaranty

(1) The Proposal Form must be accompanied by a cashier's check, drawn on an Alabama bank, or a Bid Bond, executed by a surety company duly authorized and qualified to make such bonds in the State of Alabama, payable to the Awarding Authority.

(2) If a Bid Bond is provided in lieu of a cashier's check, the bond shall be on the Bid Bond form as stipulated in the Bid Documents.

(3) The amount of the cashier's check or Bid Bond shall not be less than five percent of the contractor's bid, but is not required to be in an amount more than ten thousand dollars.

c. Delivery of Bids:

(1) Bids will be received until the time set, and at the location designated, in the Advertisement for Bids unless notice is given of postponement. Any bid not received prior to the time set for opening bids will be rejected absent extenuating circumstances and such bids shall be rejected in all cases where received after other bids are opened.

(2) Each bid shall be placed, together with the bid guaranty, in a sealed envelope. On the outside of the envelope the bidder shall write in large letters "Proposal", below which the bidder shall identify the Project and the Work bid on, the name of the bidder, and the bidder's current general contractor's state license number.

(3) Bids may be delivered in person, or by mail if ample time is allowed for delivery. When sent by mail, the sealed envelope containing the bid, marked as indicated above, shall be enclosed in another envelope for mailing.

9. WITHDRAWAL or REVISION of BIDS:

a. A bid may be withdrawn prior to the time set for opening of bids, provided a written request, executed by the bidder or the bidder's "authorized representative", is filed with the Architect prior to that time. The bid will then be returned to the bidder unopened.

b. A bid which has been sealed in its delivery envelope may be revised by writing the change in price on the outside of the delivery envelope over the signature of the bidder or the bidder's "authorized representative". In revising the bid in this manner, the bidder must only write the amount of the change in price on the envelope **and must not reveal the bid price.**

c. Written communications, signed by the bidder or its "authorized representative", to revise bids will be accepted if received by the Architect prior to the time set for opening bids. The Architect will record the instructed revision upon opening the bid. Such written communication

may be by facsimile if so stipulated in Supplemental Instructions to Bidders. In revising the bid in this manner, the bidder must only write the amount of the change in price **and must not reveal the bid price.**

d. Except as provided in Article 12 of these Instructions to Bidders, no bid shall be withdrawn, modified, or corrected after the time set for opening bids.

10. OPENING of BIDS:

Bids will be opened and read publicly at the time and place indicated in the Advertisement for Bids. Bidders or their authorized representatives are invited to be present.

11. INCOMPLETE and IRREGULAR BIDS:

A bid that is not accompanied by data required by the Bid Documents, or a bid which is in any way incomplete, may be rejected. Any bid which contains any uninitialed alterations or erasures, or any bid which contains any additions, alternate bids, or conditions not called for, or any other irregularities of any kind, will be subject to rejection.

12. BID ERRORS

a. Errors and Discrepancies in the Proposal Form. In case of error in the extension of prices in bids, the unit price will govern. In case of discrepancy between the prices shown in the figures and in words, the words will govern.

b. Mistakes within the Bid. If the low bidder discovers a mistake in its bid, the low bidder may seek withdrawal of its bid without forfeiture of its bid guaranty under the following conditions:

(1) Timely Notice: The low bidder must notify the Awarding Authority and Architect in writing, within three working days after the opening of bids, that a mistake was made. This notice must be given within this time frame whether or not award has been made.

(2) Substantial Mistake: The mistake must be of such significance as to render the bid price substantially out of proportion to the other bid prices.

(3) Type of Mistake: The mistake must be due to calculation or clerical error, an inadvertent omission, or a typographical error which results in an erroneous sum. A mistake of law, judgment, or opinion shall not constitute a valid ground for withdrawal without forfeiture.

(4) Documentary Evidence: Clear and convincing documentary evidence of the mistake must be presented to the Awarding Authority and the Architect as soon as possible, but no later than three working days after the opening of bids.

The Awarding Authority's decision regarding a low bidder's request to withdraw its bid without penalty shall be made within 10 days after receipt of the bidder's evidence or by the next regular meeting of the Awarding Authority. Upon withdrawal of bid without

penalty, the low bidder shall be prohibited from (1) doing work on the project as a subcontractor or in any other capacity and (2) bidding on the same project if it is re-bid.

13. DISQUALIFICATION of BIDDERS:

Any bidder(s) may be disqualified from consideration for contract award for the following reasons:

a. Collusion. Any agreement or collusion among bidders or prospective bidders in restraint of freedom of competition to bid at a fixed price or to refrain from bidding or otherwise shall render the bids void and shall cause the bidders or prospective bidders participating in such agreement or collusion to be disqualified from submitting further bids to the Awarding Authority on future lettings. (See § 39-2-6, Code of Alabama 1975, for possible criminal sanctions.)

b. Advance Disclosure. Any disclosure in advance of the terms of a bid submitted in response to an Advertisement for Bids shall render the proceedings void and require re-advertisement and rebid.

c. Failure to Settle Other Contracts. The Awarding Authority may reject a bid from a bidder who has not paid, or satisfactorily settled, all bills due for labor and material on other contracts in force at the time of letting.

14. CONSIDERATION of BIDS:

a. After the bids are opened and read publicly, the bid prices will be compared and the results of this comparison will be available to the public. Until the final award of the contract, however, the Awarding Authority shall have the right to reject any or all bids, and it shall have the right to waive technical errors and irregularities if, in its judgment, the bidder will not have obtained a competitive advantage and the best interests of the Awarding Authority will be promoted.

b. If the Bid Documents request bids for projects or parts of projects in combination or separately, the Bid Documents must include modifications of, or supplements to, these Instructions to Bidders setting forth applicable bid procedures. Award or awards will be made to the lowest responsible and responsive bidder or bidders in accordance with such bid procedures.

15. DETERMINATION of LOW BIDDER by USE of ALTERNATES

a. The Awarding Authority may request alternate bid prices (alternates) to facilitate either reducing the base bid to an amount within the funds available for the project or adding items to the base bid within the funds available for the project. Alternates, if any, are listed in the Proposal Form in the order in which they shall cumulatively deduct from or add to the base bid for determining the lowest bidder.

b. If alternates are included in the Proposal Form, the Awarding Authority shall determine the dollar amount of funds available and immediately prior to the opening of bids shall announce publicly the funds available for the project. The dollar amount of such funds shall be used to determine the lowest bidder as provided herein below, notwithstanding that the actual funds available for the project may subsequently be determined to be more or less than the expected funds available as determined immediately prior to the time of the opening of bids.

c. If the base bid of the lowest bidder exceeds the funds available and alternate bid prices will reduce the base bids to an amount that is within the funds available, the lowest bidder will be determined by considering, in order, the fewest number of the alternates that produces a price within the funds available. If the base bid of the lowest bidder is within the funds available and alternate bid prices will permit adding items to the base bid, the lowest bidder will be determined by considering, in order, the greatest number of the alternates that produces a price within the funds available.

d. After the lowest bidder has been determined as set forth above, the Awarding Authority may award that bidder any combination of alternates, provided said bidder is also the low bidder when only the Base Bid and such combination of alternates are considered.

16. UNIT PRICES:

a. Work Bid on a Unit Price Basis. Where all, or part(s), of the planned Work is bid on a unit price basis, both the unit prices and the extensions of the unit prices constitute a basis of determining the lowest responsible and responsive bidder. In cases of error in the extension of prices of bids, the unit price will govern. A bid may be rejected if any of the unit prices are obviously unbalanced or non-competitive.

b. Unit Prices for Application to Change Orders. As a means of predetermining unit costs for changes in certain elements of the Work, the Bid Documents may require that the bidders furnish unit prices for those items in the Proposal Form. Unit prices for application to changes in the work are not a basis for determining the lowest bidder. Non-competitive unit prices proposed by the successful bidder may be rejected and competitive prices negotiated by the Awarding Authority prior to contract award. Unit prices for application to changes in the work are not effective unless specifically included and agreed upon in the Construction Contract.

17. AWARD of CONTRACT:

a. The contract shall be awarded to the lowest responsible and responsive bidder unless the Awarding Authority finds that all the bids are unreasonable or that it is not in the best interest of the Awarding Authority to accept any of the bids. A responsible bidder is one who, among other qualities determined necessary for performance, is competent, experienced, and financially able to perform the contract. A responsive bidder is one who submits a bid that complies with the terms and conditions of the Advertisement for Bids and the Bid Documents. Minor irregularities in the bid shall not defeat responsiveness.

b. A bidder to whom award is made will be notified by telegram, confirmed facsimile, or letter to the address shown on the Proposal Form at the earliest possible date. Unless other

time frames are stipulated in Supplemental Instructions to Bidders, the maximum time frames allowed for each step of the process between the opening of bids and the issuance of an order to proceed with the work shall be as follows:

(1)	Award of contract by Awarding Authority	30 calendar days after the opening of bids
(2)	Contractor's return of the fully executed contract, with bonds and evidence of insurance, to the Awarding Authority	15 calendar days after the contract has been presented to the contractor for signature
(3)	Awarding Authority's approval of the contractor's bonds and evidence of insurance and completion of contract execution	20 calendar days after the contractor presents complete and acceptable documents to the Architect
(4)	Notice To Proceed issued to the contractor	15 calendar days after final execution of contract by the Awarding Authority, and by the Governor if his or her signature on the contract is required by law

The time frames stated above, or as otherwise specified in the Bid Documents, may be extended by written agreement between the parties. Failure by the Awarding Authority to comply with the time frames stated above or stipulated in Supplemental Instructions to Bidders, or agreed extensions thereof, shall be just cause for the withdrawal of the contractor's bid and contract without forfeiture of bid security.

c. Should the successful bidder or bidders to whom the contract is awarded fail to execute the Construction Contract and furnish acceptable Performance and Payment Bonds and satisfactory evidence of insurance within the specified period, the Awarding Authority shall retain from the bid guaranty, if it is a cashier's check, or recover from the principal or the sureties, if the guaranty is a bid bond, the difference between the amount of the contract as awarded and the amount of the bid of the next lowest responsible and responsive bidder, but not more than $10,000. If no other bids are received, the full amount of the bid guaranty shall be so retained or recovered as liquidated damages for such default. Any sums so retained or recovered shall be the property of the Awarding Authority.

d. All bid guaranties, except those of the three lowest bona fide bidders, will be returned immediately after bids have been checked, tabulated, and the relation of the bids established. The bid guaranties of the three lowest bidders will be returned as soon as the contract bonds and the contract of the successful bidder have been properly executed and approved. When the award is deferred for a period of time longer than 15 days after the opening of the bids, all bid guaranties, except those of the potentially successful bidders, shall be returned. If no award is made within the specified period, as it may by agreement be extended, all bids will be rejected, and all guaranties returned. If any potentially successful bidder agrees in writing to a stipulated extension in time for consideration of its bid and its bid was guaranteed with a cashier's check, the Awarding Authority may permit the potentially successful bidder to substitute a satisfactory bid bond for the cashier's check.

END of INSTRUCTIONS TO BIDDERS

SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

1. PRE-BID UTILITIES COORDINATION: The successful bidder, to whom the project is awarded shall be solely responsible for contacting ALL local utility service agencies (University/private/public/municipal) PRIOR to bidding to determine the scope of modifications, if any, to all utilities on site of work or adjacent to site in right-of-ways or easements due to work scope of this project. The Contractor shall make arrangements for, and pay all costs for modification, relocation or abandonment of existing utilities/services as required. Bidders may contact Auburn University, Facilities Division Maintenance and Operations, Utilities Records Department (334) 844-9410 for information regarding those utilities owned by Auburn University.

2. PRE-BID OBSERVATION: Bidders shall visit the site and become familiar with the existing conditions, facilities, project requirements and project site. Bidders may schedule a visit to the site with the Owner's Representative, up to three (3) working days prior to bid.

3. ATTACHMENTS TO PROPOSAL FORM: NAMING OF SUBCONTRACTORS AND SUPPLIERS, UNIT PRICES. When required / included in these documents, all attachments shall be submitted with the proposal unless otherwise stipulated. The Contractor must utilize those subcontractors and suppliers named, unless he can demonstrate to the Owner's satisfaction a compelling reason to change any of those named. For each subcontractor or supplier required on the proposal attachment(s), bidders shall name one and only one entity. In cases where alternates potentially change the "low" sub or supplier, bidders shall include names for "low" subs and suppliers at "Base Bid" unless otherwise stipulated.

Where the technical specifications require the use of a specialty subcontractor, (or other term which means a firm or company who is currently engaged in that trade as their primary work trade), one must be named on the attachment and employed on the project at no additional cost to the Owner.

Should the prime contractor bidder be one who regularly performs one or more of the specialty trades / subcontracts with its own forces, the prime contractor bidder may list itself, provided it can demonstrate without question to the Owner and the Architect that it performs this specific trade / specialty on a regular basis, utilizing skilled, experienced tradespersons who are on the full time payroll of the prime. Further, the prime must submit proof that it has completed a substantial (ten or more) number of similar projects, requiring similar specialty trades during the past two years, using its own forces. (Refer to the General Conditions for other requirements)

4. ADDITIONAL SUBMITTALS WITHIN 24 HOURS OF RECEIPT OF BIDS:
The apparent low bidder shall submit to the Owner and the Architect a complete list of all subcontractors, with their State of Alabama (Sub) Contractor's license numbers, and all materials suppliers for subcontracts and/or materials purchases in excess of $50,000.00.
This is in addition to the attachments referenced in paragraph 4 of these Supplemental Instructions to Bidders, which must be submitted with the proposal at the time of bid. All clarifications to the list of subs submitted with the proposal must be submitted and described in detail in this "within 24 hours" submittal (items such as changes of Subs due to alternates, etc.).

The apparent low bidder shall submit to the Owner and the Architect a preliminary cost breakdown / schedule of values which shows the approximate cost for each section of work /trade / subcontract. A final schedule of values will be required as described in the General Conditions.

5. ADDITIONAL SUBMITTALS WITHIN 10 DAYS OF THE CONTRACT AWARD:
For contracts in excess of $5,000.00, the Contractor awarded the contract shall submit within ten (10) days of the award a copy of the State of Alabama Disclosure Statement required by Act 2001- 955. A copy of the Disclosure Statement is included herein as Form C-5A-Attachment A to Construction Contract.

6. SALES TAX
This project is exempt from Sales Tax. Contractor's bids are not to include Sales Tax on materials (tangible personal property) to be incorporated into realty (see attached AU Form C-2A SUTE.

7. AWARD OF CONTRACT
No bid may be withdrawn after the scheduled closing time for receipt of bids for a period of sixty (60) days. The Owner reserves the right to reject bids if such action is determined to be in the best interest of the Owner.

8. BID GUARANTY
When the bid amount is less than $50,000.00, no bid bond security is required.
A bid bond is not required when the bid amount is less than $50,000.00.

9. CERTIFICATION PURSUANT TO ACT NO. 2006-557
ALABAMA LAW (SECTION 41-4-116, CODE OF ALABAMA 1975) PROVIDES THAT EVERY BID SUBMITIED AND CONTRACT EXECUTED SHALL CONTAIN A CERTIFICATION THAT THE VENDOR, CONTRACTOR, AND ALL OF ITS AFFILIATES THAT MAKE SALES FOR DELIVERY INTO ALABAMA OR LEASES FOR USE IN ALABAMA ARE REGISTERED, COLLECI1NG, AND REMITTING ALABAMA STATE AND LOCAL SALES, USE, AND/OR LEASE TAX ON ALL TAXABLE SALES AND LEASES INTO ALABAMA. **BY SUBMITTING THIS BID. THE BIDDER IS HEREBY CERTIFYING THAT THEY ARE IN FULL COMPLIANCE WITH ACT NO. 2006-557**, THEY ARE NOT BARRED FROM. BIDDING OR ENTERING INTO A CONTRACT PURSUANT TO 41-4-116, AND ACKNOWLEDGES THAT THE AWARDING AUTHORITY MAY DECLARE THE CONTRACT VOID IF THE CERTIFICATION IS FALSE.

PROPOSAL FORM

To: Auburn University _____ Date: _____
(Awarding Authority)

In compliance with your Advertisement for Bids and subject to all the conditions thereof, the undersigned

_____
(Legal Name of Bidder)

hereby proposes to furnish all labor and materials and perform all work required for the construction of

WORK: Goodwin Hall Renovations and Band Rehearsal Hall Addition

in accordance with Drawings and Specifications, dated June 14, 2017, prepared by Barganier Davis Sims Architects Associated, Architect/Engineer.

The Bidder, which is organized and existing under the laws of the State of _____,

having its principal offices in the City of _____,

is: ☐ a Corporation ☐ a Partnership ☐ n individual ☐ (other) _____.

LISTING OF PARTNERS OR OFFICERS: If Bidder is a Partnership, list all partners and their addresses; if Bidder is a Corporation, list the names, titles, and business addresses of its officers:

_____

_____

_____

BIDDER'S REPRESENTATION: The Bidder declares that it has examined the site of the Work, having become fully informed regarding all pertinent conditions, and that it has examined the Drawings and Specifications (including all Addenda received) for the Work and the other Bid and Contract Documents relative thereto, and that it has satisfied itself relative to the Work to be performed.

ADDENDA: The Bidder acknowledges receipt of Addenda Nos._____ through _____ inclusively.

BASE BID: For construction complete as shown and specified, the sum of _____

_____ Dollars ($ _____)

ALTERNATES: If alternates as set forth in the Bid Documents are accepted, the following adjustments are to be made to the Base Bid:

For Alternate No. 1 (Renovate Existing Building) (add) $ _____

For Alternate No. 2 (Acoustical Curtains) (add) $ _____

For Alternate No. 3 (Construct 4 Offices in Basement) (add) $_____

For Alternate No. 4 (Carpet /Wall –Storage 008) (add) $ _____

UNIT PRICES - (See Attachment)

BID SECURITY: The undersigned agrees to enter into a Construction Contract and furnish the prescribed Performance and Payment Bonds and evidence of insurance within fifteen calendar days, or such other period stated in the Bid Documents, after the contract forms have been presented for signature, provided such presentation is made within 30 calendar days after the opening of bids, or such other period stated in the Bid Documents. As security for this condition, the undersigned further agrees that the funds represented by the Bid Bond (or cashier's check) attached hereto may be called and paid into the account of the Awarding Authority as liquidated damages for failure to so comply.

Attached hereto is a: (*Mark the appropriate box and provide the applicable information.*)

☐ Bid Bond, executed by _____as Surety,

☐ a cashier's check on the_____ Bank of _____,

for the sum of _____ Dollars

($ _____) made payable to the Awarding Authority.

BIDDER'S ALABAMA LICENSE:

State License for General Contracting: _____

License Number Bid Limit Type(s) of Work

CERTIFICATIONS: The undersigned certifies that he or she is authorized to execute contracts on behalf of the Bidder as legally named, that this proposal is submitted in good faith without fraud or collusion with any other bidder, that the information indicated in this document is true and complete, and that the bid is made in full accord with State law. Notice of acceptance may be sent to the undersigned at the address set forth below.

The Bidder also declares that a list of all proposed major subcontractors and suppliers will be submitted at a time subsequent to the receipt of bids as established by the Architect in the Bid Documents but in no event shall this time exceed twenty-four (24) hours after receipt of bids.

Legal Name of Bidder _____

Mailing Address _____

* **By (Legal Signature)** _____

* Name (type or print) _____ (*Seal*)

* Title _____

Telephone Number _____

* If other than the individual proprietor, or an above named member of the Partnership, or the above named president, vice-president, or secretary of the Corporation, attach written authority to bind the Bidder. Any modification to a bid shall be over the initials of the person signing the bid, or of an authorized representative.

JULIE P. MAGEE
Commissioner

State of Alabama
Department of Revenue
(www.revenue.alabama.gov)
50 North Ripley Street
Montgomery, Alabama 36132

MICHAEL E. MASON
Assistant Commissioner
JOE W. GARRETT, JR.
Deputy Commissioner
CURTIS E. STEWART
Deputy Commissioner

Alabama Department of Revenue
NOTICE

Tax Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts

Legislative Act 2013-205 requires the Department of Revenue to issue Form STC-1, *Sales and Use Tax Certificate of Exemption for Government Entity Projects*, to all contractors and subcontractors working on qualifying governmental entity projects once the Form ST: EXC-01 is approved.

Each exempt entity, contractor and subcontractor must make application for qualification of the exemption using Form ST: EXC-01 for each tax-exempt project. The application is available on the department's website at http://revenue.alabama.gov/salestax/ST-EXC-01.pdf. Applications should be submitted directly to the Sales and Use Tax Division Central Office, P.O Box 327710, Montgomery, AL 36132-7710.

The sales and use tax exemption provided for in Act 2013-205 applies to the purchase of building materials, construction materials and supplies, and other tangible personal property that become part of the structure pursuant to a qualifying contract entered into on or after January 1, 2014. Qualifying projects and contracts are those generally entered into with the following governmental entities, unless otherwise noted: the State of Alabama, a county or incorporated municipality of Alabama, an Alabama public school, or an Alabama industrial or economic development board or authority already exempt from sales and use taxes. **Please note that contracts entered into with the federal government and contracts pertaining to highway, road, or bridge construction or repair do not qualify for the exemption provided for in Act 2013-205.** [Reference: Sales and Use Tax Division Administrative Rule 810-6-3-.77 *Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities.*]

The Alabama Department of Revenue will assign each contractor and sub-contractor a consumers use tax account, if one is currently not in place, at the time the Form STC-1, Sales *and Use Tax Certificate of Exemption for Government Entity Projects*, is issued.

Contractors and sub-contractors for qualifying projects will be required to file monthly consumers use tax returns and report all exempt purchases for ongoing projects, as well as all taxable purchases on one return. These returns are required to be filed through the department's online tax return filing and payment portal, My Alabama Taxes (https://myalabamataxes.alabama.gov).

As another option for these types of contracts, as well as with other contracts entered into with other types of exempt entities, the Form ST:PAA1, *Purchasing Agent Appointment*, may be used. However, please be advised that the use of the Form ST:PAA1 option will require the exempt entity to be invoiced directly and pay for directly from their funds any construction and building material and supply purchases.

For additional information concerning this guidance, taxpayers should contact Sales and Use Tax Division representative Thomas Sims at 334-242-1574 or by email at Thomas.Sims@revenue.alabama.gov.

ACCOUNTING OF SALES TAX
Attachment to ABC Form C-3
Proposal Form

To: _____ Date: _____
(Awarding Authority)

NAME OF PROJECT _____

_____

SALES TAX ACCOUNTING

Pursuant to Act 2013-205, Section 1(g) the Contractor accounts for the sales tax NOT included in the bid proposal form as follows:

		ESTIMATED SALES TAX AMOUNT
BASE BID:		$ _____
Alternate No. 1 (.....) (Insert key word for Alternate)	(add)(deduct)	$ _____
Alternate No. 2 (.....)	(add)(deduct)	$ _____
Alternate No. 3 (.....)	(add)(deduct)	$ _____
Alternate No. 4 (.....)	(add)(deduct)	$ _____
Alternate No. 5 (.....)	(add)(deduct)	$ _____
Alternate No. 6 (.....)	(add)(deduct)	$ _____

Failure to provide an accounting of sales tax shall render the bid non-responsive. Other than determining responsiveness, sales tax accounting shall not affect the bid pricing nor be considered in the determination of the lowest responsible and responsive bidder.

Legal Name of Bidder _____

Mailing Address _____

*** By (Legal Signature)** _____

* Name (type or print) _____ (*Seal*)

* Title _____

Telephone Number _____

ATTACHMENT 'B' TO PROPOSAL FORM

STATED ALLOWANCES AND UNIT PRICES

STATED ALLOWANCE AND UNIT PRICES

The following items of work are anticipated during construction of this contract; however the exact quantity of each work item may not be determinable prior to bidding. The Contractor, shall therefore, include in his Lump Sum Base and / or Alternates Bid (as applicable), an allowance for the following items in the quantities indicated: Allowance Unit Prices include all charges for labor, materials and equipment, shoring, layout, supervision (field and home office), general expenses, taxes, insurances, overhead and profit, but not limited to, for accomplishment of the Allowance item(s). Where quantities of same items of work are defined and are quantified in the bid documents, the allowance quantities indicated hereinafter shall be in addition to those which are indicated. (Example: If the site grading plan indicates new and existing grades, the bidder shall compute the quantity of earthwork required and include that quantity of work in the bid the same as if no "allowance quantity were specified. If an additional allowance quantity of earthwork is stipulated, that stipulated allowance quantity of work shall also be included in addition to the quantity computed from the bidders earthwork "takeoff").

The following Unit Prices Quoted are for increases or decreases in the above quantities included in the Lump Sum Base and/or Alternate Bids. These Unit Prices include all charges for labor, materials and equipment, fee, layout, supervision (field and home office), general expenses, taxes, insurances, overhead and profit, but not limited to, for accomplishment of the Unit Price item(s).

> Clarification Note: The Unit Prices quoted by the Contractor shall apply to increases (additive change orders) and to decreases (deductive change orders). This requirement shall supplement the requirements of the General Conditions, and Instructions to Bidders. Changes in the contract amount which are computed using the Stated Allowances and Unit Prices shall be figured at the same unit price whether additive or deductive.

ITEM	ALLOWANCE QUANTITY	ALLOWANCE UNIT PRICE	TOTAL
A.	300 Cubic Yards		
B.	300 Cubic Yards		

* See attached unit price section 01270 for description of unit price A and B.

ITEM	ALLOWANCE QUANTITY	ALLOWANCE UNIT PRICE	TOTAL

SECTION 01270 UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Contractor unit prices.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures".

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Owner.

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

E. PRODUCTS (Not Used)

PART 2 - EXECUTION

2.1 LIST OF UNIT PRICES

A. In addition to the Contractor’s Base Bid Sum, the Bidder proposes the following Unit Prices to adjust the Contract Sum (additions and / or deductions) as required. The Bidder understands that such Unit Prices are the total cost to the Owner for each unit of work to include the cost of direct and indirect overhead; profit; labor; materials; equipment; subcontractor; and, any other cost not specifically mentioned, but necessary for the performance of the work units listed below, for every tier involved. The quantities, as measured and multiplied by the Unit Cost are the total cost for the addition or deduction to the Contract Sum.

B. UNIT PRICE SCHEDULE:

1. Attached to Proposal Form at time of Bid (use attached form – see next page).

CONTRACTOR's UNIT PRICE SCHEDULE (Bid Attachment To Proposal Form)

In addition to the Contractor's Base Bid Sum, the Bidder proposes the following Unit Prices to adjust the Contract Sum (additions and / or deductions) as required. The Bidder understands that such Unit Prices are the total cost to the Owner for each unit of work to include the cost of direct and indirect overhead; profit; labor; materials; equipment; subcontractor; and, any other cost not specifically mentioned, but necessary for the performance of the work units listed below, for every tier involved. The quantities, as measured and multiplied by the Unit Cost are the total cost for the addition or deduction to the Contract Sum. 'IAW' shall mean 'In Accordance With'.

These Unit Prices shall be used for unforeseen conditions, Owner / Architect / Engineer directed change orders, and any other extraordinary condition beyond the stated allowances included in Section 01210 that are not included in the Base Bid for this Project.

A. **Unit Price Number One**: Excavation / Removal of Soil Materials:

1. Narrative Description for the Removal of Unsuitable Material and Excess Topsoil – Payment for "Removal of Unsuitable Material and Excess Topsoil" shall be made at the unit price bid, per cubic yard in place (CYIP) removed, and shall be compensation in full for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work. Payment for this item will include Removal of Unsuitable Material and Excess Topsoil underneath the building and surrounding areas. Base bid includes the removal of all structural excavation spoils as deemed necessary at an off-site location. Haul tickets shall not be considered a valid determination of quantities. Following topsoil stripping, the Contractor shall notify the Owner's Representative forty-eight (48) hours before any unsuitable material is excavated, so the area may be delineated and removal depths measured to derive the cubic yards of topsoil removal. Following the removal of unsuitable material, the Contractor shall notify the Owner's Representative forty-eight (48) hours before any replacement material is placed, so the area may be delineated and removal depths measured to derive the cubic yards of unsuitable removal. Failure to notify the Owner's Representative and performing unsuitable excavation without his/her presence for measurement shall forfeit payment of that amount of unobserved work. **Contractor to include 300 cubic yards in the base bid.**

2. Unit of Measure: Cubic Yard In Place (CYIP) $_____

B. **Unit Price Number Two**: Placement of Engineered Fill Material:

1. Narrative Description for the Replacement of Engineered Material– Payment for "Replacement of Unsuitable Material" shall be made at the unit price bid, per cubic yard in place (CYIP) replaced, and shall be compensation in full for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work. Payment for this item will include replacement of Unsuitable Material, to noted elevation grade, which is removed from the project site under the "Removal of Unsuitable Material and Excess Topsoil" item. Haul tickets shall not be considered a valid determination of quantities. The replacement quantity shall be determined the "Removal of Unsuitable Material and Excess Topsoil" item, less topsoil removed. **Contractor to include 300 cubic yards in the base bid.**

2. Unit of Measure: Cubic Yard In Place (CYIP) $_____

END OF SECTION

Allowance Usage Authorization

AU Job No.: _____ **Date Issued:** _____
Project: _____ **Bid Package No.:** _____
Contractor: _____ **Authorization No.:** _____

Ref.: _____

Item	Description	Proposal - "Attachment B"				From Previous	This Period	Allowance Qty. Remaining	Allowance $ Remaining
		Allowance Qty	Unit	Allowance Unit Price	Total				
1					$0.00	-	-	0	$0.00
2					$0.00	-	-	0	$0.00
3					$0.00	-	-	0	$0.00
4					$0.00	-	-	0	$0.00
5					$0.00	-	-	0	$0.00
6					$0.00	-	-	0	$0.00
7					$0.00	-	-	0	$0.00
8					$0.00	-	-	0	$0.00
9					$0.00	-	-	0	$0.00
10					$0.00	-	-	0	$0.00
11					$0.00	-	-	0	$0.00
12					$0.00	-	-	0	$0.00
13					$0.00	-	-	0	$0.00
	TOTAL				$0.00				

Contractor shall notify AU Project Manager in writing, if authorized allowance(s) is projected to exceed its proposal quantity. This form only authorizes the use of allowance as defined in Contractors Attachment "B" to the proposal form. Any work required beyond the proposal allowance(s) shall be approved by Constriction Manager / Owner. All terms and conditions of the Contract Documents shall remain unchanged.

APPROVED BY: Auburn University

By: _____
Title: _____
Date: _____

ACCEPTED BY: CONTRACTOR

By: _____
Title: _____
Date: _____

Certifications of Compliance

By signing below and submitting this bid, the bidder is hereby certifying that they are in full compliance with all applicable laws of Code of Alabama and acts related to:

Title 34: Professions and Businesses

Title 39: Public Works

Title 41: State Government

CERTIFICATION: The undersigned certifies that he or she is authorized to execute this certification on behalf of the Bidder as legally named on the Proposal Form (ABC Form C-3).

Legal Name of Bidder

_____

Mailing Address

_____

By (Legal Signature)_____

Name (type or print) _____

Title _____

Telephone Number _____

USE BLACK INK ONLY

BID BOND

The **PRINCIPAL** (*Bidder's Name and Address*)

The **SURETY** (*Name and Principal Place of Business*)

The **OWNER** (*Name and Address*)

The **PROJECT** for which the Principal's Bid is submitted: (*Project name as it appears in the Bid Documents*)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Principal and Surety, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the **PENAL SUM of five percent (5%) of the amount of the Principal's bid, but in no event more than Ten-thousand Dollars ($10,000.00)**.

THE CONDITION OF THIS OBLIGATION is that the Principal has submitted to the Owner the attached bid, which is incorporated herein by reference, for the Project identified above.

NOW, THEREFORE, if, within the terms of the Bid Documents, the Owner accepts the Principal's bid and the Principal thereafter either:

(a) executes and delivers a Construction Contract with the required Performance and Payment Bonds (each in the form contained in the Bid Documents and properly completed in accordance with the bid) and delivers evidence of insurance as prescribed in the Bid Documents, or

(b) fails to execute and deliver such Construction Contract with such Bonds and evidence of insurance, but pays the Owner the difference, not to exceed the Penal Sum of this Bond, between the amount of the Principal's Bid and the larger amount for which the Owner may award a Construction Contract for the same Work to another bidder,

then, this obligation shall be null and void, otherwise it shall remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that the obligation of the Surety under this Bond shall not in any manner be impaired or affected by any extension of the time within which the Owner may accept the Principal's bid, and the Surety does hereby waive notice of any such extension.

SIGNED AND SEALED this _____ day of _____, _____.

ATTEST:

_____

PRINCIPAL:

_____

By _____

_____
Name and Title

SURETY:

ATTEST

_____

_____

By _____

_____
Name and Title

Numbers in margin correspond to "Checklist", ABC Form B-7

(1) **BC Project No.**

CONSTRUCTION CONTRACT

(2) This Construction Contract is entered into this day of in the year of
(3) between the **OWNER(s),**

(4) and the **CONTRACTOR,**

(5) for the **WORK** of the Project, identified as:

(6) The **CONTRACT DOCUMENTS** are dated and have been amended by
(7) **ADDENDA**

(8) The **ARCHITECT** is

(9) The **CONTRACT SUM** is Dollars
($) and is the sum of the Contractor's Base Bid for the Work and the following
(10) **BID ALTERNATE PRICES:**

(11) The **CONTRACT TIME** is ( ) calendar days.

THE OWNER AND THE CONTRACTOR AGREE AS FOLLOWS:

The Contract Documents, as defined in the General Conditions of the Contract (ABC Form C-8), are incorporated herein by reference. The Contractor shall perform the Work in accordance with the Contract Documents. The Owner will pay and the Contractor will accept as full compensation for such performance of the Work, the Contract Sum subject to additions and deductions (including liquidated damages) as provided in the Contract Documents. The Work shall be commenced on a date to be specified in a Notice to Proceed issued by the Owner or the Director, Technical Staff, Alabama Building Commission, and shall then be substantially completed within the Contract Time.

(12) **LIQUIDATED DAMAGES** for which the Contractor and its Surety (if any) shall be liable and may be required to pay the Owner in accordance with the Contract Documents shall be equal to six percent interest per annum on the total Contract Sum unless a dollar amount is stipulated in the following space, in which case liquidated damages shall be determined at _____ dollars ($_____) per calendar day.

Numbers in margin correspond to "Checklist", ABC Form B-7

(13) **SPECIAL PROVISIONS** *(Special Provisions may be inserted here, such as Acceptance or Rejection of Unit Prices.)*

(14) **STATE GENERAL CONTRACTOR'S LICENSE:** The Contractor does hereby certify that Contractor is currently licensed by the Alabama State Licensing Board for General Contractors and that the certificate for such license bears the following:

License No. Bid Limit: Classification:

The Owner and Contractor have entered into this Construction Contract as of the date first written above and have executed this Construction Contract in sufficient counterparts to enable each contracting party to have an originally executed Construction Contract each of which shall, without proof or accounting for the other counterparts, be deemed an original thereof.

The Owner does hereby certify that this Construction Contract was let in accordance with the provisions of Title 39, Code of Alabama 1975, as amended, and all other applicable provisions of law, and that the terms and commitments of this Construction Contract do not constitute a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26.

(15)

APPROVALS	CONTRACTING PARTIES
_____	_____ Contractor
By _____	By _____ Name & Title _____
STATE OF ALABAMA BUILDING COMMISSION *(Not required for locally-funded, SDE projects.)*	_____ Owner
By _____ Director, Technical Staff	By _____ Name & Title _____

ABC Form C-6
August 2001

(1)

PERFORMANCE BOND

USE BLACK INK ONLY

SURETY"S BOND NUMBER

Numbers in margin correspond to "Checklist", ABC Form B-7

(2) The **PRINCIPAL** (*Name and address of Contractor as appear in the Construction Contract*)

(3) The **SURETY** (*Name and Principal Place of Business*)

(4) The **OWNER** (*Name and address, same as appears in the Construction Contract*)

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above for the performance of the Contract, and Contract Change Orders, in accord with the requirements of the Contract Documents, which are incorporated herein by reference. If the Contractor performs the Contract, and Contract Change Orders, in accordance with the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.
2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to "Checklist", ABC Form B-7

3. Whenever the Architect gives the Contractor and the Surety, at their addresses stated above, a written Notice to Cure a condition for which the Contract may be terminated in accordance with the Contract Documents, the Surety may, within the time stated in the notice, cure or provide the Architect with written verification that satisfactory positive action is in process to cure the condition.

4. The Surety's obligation under this Bond becomes effective after the Contractor fails to satisfy a Notice to Cure and the Owner:
   (a) gives the Contractor and the Surety, at their addresses stated above, a written Notice of Termination declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the notice; and
   (b) gives the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation under this Bond.

5. In the presence of the conditions described in Paragraph 4, the Surety shall, at its expense:
   (a) On the effective date of the Notice of Termination, take charge of the Work and be responsible for the safety, security, and protection of the Work, including materials and equipment stored on and off the Project site, and
   (b) Within twenty-one days after the effective date of the Notice of Termination, proceed, or provide the Owner with written verification that satisfactory positive action is in process to facilitate proceeding promptly, to complete the Work in accordance with the Contract Documents, either with the Surety's resources or through a contract between the Surety and a qualified contractor to whom the Owner has no reasonable objection.

6. As conditions precedent to taking charge of and completing the Work pursuant to Paragraph 5, the Surety shall neither require, nor be entitled to, any agreements or conditions other than those of this Bond and the Contract Documents. In taking charge of and completing the Work, the Surety shall assume all rights and obligations of the Contractor under the Contract Documents; however, the Surety shall also have the right to assert "Surety Claims" to the Owner in accordance with the Contract Documents. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to promptly take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

7. By accepting this Bond as a condition of executing the Construction Contract, and by taking the actions described in Paragraph 4, the Owner agrees that:
   (a) the Owner shall promptly advise the Surety of the unpaid balance of the Contract Sum and, upon request, shall make available or furnish to the Surety, at the cost of reproduction, any portions of the Project Record, and
   (b) as the Surety completes the Work, or has it completed by a qualified contractor, the Owner shall pay the Surety, in accordance with terms of payment of the Contract Documents, the unpaid balance of the Contract Sum, less any amounts that may be or become due the Owner from the Contractor under the Construction Contract or from the Contractor or the Surety under this Bond.

8. In the presence of the conditions described in Paragraph 4, the Surety's obligation includes responsibility for the correction of Defective Work, liquidated damages, and reimbursement of any reasonable expenses incurred by the Owner as a result of the Contractor's default under the Contract, including architectural, engineering, administrative, and legal services.

Numbers in margin correspond to "Checklist", ABC Form B-7

9. Nothing contained in this Bond shall be construed to mean that the Surety shall be liable to the Owner for an amount exceeding the Penal Sum of this Bond, except in the event that the Surety should be in default under the Bond by failing or refusing to take charge of and complete the Work pursuant to Paragraph 5. If the Surety should fail or refuse to take charge of and complete the Work, the Owner shall have the authority to take charge of and complete the Work, or have it completed, and the following costs to the Owner, less the unpaid balance of the Contract Sum, shall be recoverable under this Bond:

(a) the cost of completing the Contractor's responsibilities under the Contract, including correction of Defective Work;

(b) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to completing the Work;

(c) interest on, and the cost of obtaining, funds to supplement the unpaid balance of the Contract Sum as may be necessary to cover the foregoing costs;

(d) the fair market value of any reductions in the scope of the Work necessitated by insufficiency of the unpaid balance of the Contract Sum and available supplemental funds to cover the foregoing costs; and

(f) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to ascertaining and collecting the Owner's losses under the Bond.

10. All claims and disputes arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9) ATTEST:

_____

CONTRACTOR as PRINCIPAL:

_____

By _____

_____
Name and Title

(10) Countersigned by
Alabama Resident Agent for Surety:

By_____

_____
Name

_____
Address

SURETY:

_____

By_____

_____
Name and Title

(11) NOTE: Power of attorney for the Surety's signatory shall be furnished with the original and five copies of the bond.

ABC Form C-7
August 2001

(1)

PAYMENT BOND

USE BLACK INK ONLY

SURETY"S BOND NUMBER

Numbers in margin correspond to "Checklist", ABC Form B-7

(2) The **PRINCIPAL** (*Name and address of Contractor, same as appears in the Construction Contract*)

(3) The **SURETY** (*Name and Principal Place of Business*)

(4) The **OWNER(s)** (*Name and address, same as appears in the Construction Contract*)

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above to promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract, which is incorporated herein by reference, and any modifications thereof by Contract Change Orders. If the Contractor and its Subcontractors promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders, then this obligation shall be null and void; otherwise to remain and be in full force and effect.
2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to "Checklist", ABC Form B-7

3. Any person that has furnished labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders for which payment has not been timely made may institute a civil action upon this Bond and have their rights and claims adjudicated in a civil action and judgment entered thereon. Notwithstanding the foregoing, a civil action may not be instituted on this bond until 45 days after written notice to the Surety of the amount claimed to be due and the nature of the claim. The civil action must commence not later than one year from the date of final settlement of the Contract. The giving of notice by registered or certified mail, postage prepaid, addressed to the Surety at any of its places of business or offices shall be deemed sufficient. In the event the Surety or Contractor fails to pay the claim in full within 45 days from the mailing of the notice, then the person or persons may recover from the Contractor and Surety, in addition to the amount of the claim, a reasonable attorney's fee based on the result, together with interest on the claim from the date of the notice.

4. Every person having a right of action on this bond shall, upon written application to the Owner indicating that labor, material, or supplies for the Work have been supplied and that payment has not been made, be promptly furnished a certified copy of this bond and the Construction Contract. The claimant may bring a civil action in the claimant's name on this Bond against the Contractor and the Surety, or either of them, in the county in which the Work is to be or has been performed or in any other county where venue is otherwise allowed by law.

5. This bond is furnished to comply with Code of Alabama, §39-1-1, and all provisions thereof shall be applicable to civil actions upon this bond.

6. All claims and disputes between Owner and either the Contractor or Surety arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9) ATTEST: **CONTRACTOR as PRINCIPAL:**

_____ _____

By _____

_____
Name and Title

(10) Countersigned by
Alabama Resident Agent for Surety: **SURETY:**

By_____ _____

_____ By_____
Name

_____ _____
Address Name and Title

(11) NOTE: Power of attorney for the Surety's signatory shall be furnished with the original and five copies of the bond.

GENERAL CONDITIONS of the CONTRACT

CONTENTS

ARTICLE 1
DEFINITIONS

Whenever the following terms, or pronouns in place of them, are used in the Contract Documents, the intent and meaning shall be interpreted as follows:

A. ALABAMA BUILDING COMMISSION: The Technical Staff of the Alabama Building Commission.

B. ARCHITECT: The Architect is the person or entity lawfully licensed to practice architecture in the State of Alabama, who is under contract with the Owner as the primary design professional for the Project and identified as the Architect in the Construction Contract. The term "Architect" means the Architect or the Architect's authorized representative. If the employment of the Architect is terminated, the Owner shall employ a new Architect whose status under the Contract Documents shall be that of the former Architect. If the primary design professional for the Project is a Professional Engineer, the term "Engineer" shall be substituted for the term "Architect" wherever it appears in this document.

C. BC PROJECT INSPECTOR: The member of the Technical Staff of the Alabama Building

Commission to whom the Project is assigned relative to executing the respective inspections and authorities described in Article 16, Inspection of the Work.

D. COMMISSION: The Alabama Building Commission, or any agency that may be designated by the Legislature as its successor.

E. CONTRACT: The Contract is the embodiment of the Contract Documents. The Contract represents the entire and integrated agreement between the Owner and Contractor and supersedes any prior written or oral negotiations, representations or agreements that are not incorporated into the Contract Documents. The Contract may be amended only by a Contract Change Order or a Modification to the Construction Contract. The contractual relationship which the Contract creates between the Owner and the Contractor extends to no other persons or entities. The Contract consists of the following Contract Documents, including all additions, deletions, and modifications incorporated therein before the execution of the Construction Contract:

(1) Construction Contract
(2) Performance and Payment Bonds
(3) Conditions of the Contract (General, Supplemental, and other Conditions)
(4) Specifications
(5) Drawings
(6) Contract Change Orders
(7) Modifications to the Construction Contract (applicable to PSCA Projects)

F. CONTRACT SUM: The Contract Sum is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. The term "Contract Sum" means the Contract Sum stated in the Construction Contract as may have been increased or decreased by Change Order(s) in accordance with the Contract Documents.

G. CONTRACT TIME: The Contract Time is the period of time in which the Contractor must achieve Substantial Completion of the Work. The date on which the Contract Time begins is specified in the written Notice To Proceed issued to the Contractor by the Owner or Director. The Date of Substantial Completion is the date established in accordance with Article 32. The term "Contract Time" means the Contract Time stated in the Construction Contract as may have been extended by Change Order(s) in accordance with the Contract Documents. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

H. CONTRACTOR: The Contractor is the person or persons, firm, partnership, joint venture, association, corporation, cooperative, limited liability company, or other legal entity, identified as such in the Construction Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

I. DEFECTIVE WORK: The term "Defective Work" shall apply to: **(1)** any product, material, system, equipment, or service, or its installation or performance, which does not conform to the requirements of the Contract Documents, **(2)** in-progress or completed Work the workmanship of which does not conform to the quality specified or, if not specified, to the quality produced by skilled workers performing work of a similar nature on similar projects in the state, **(3)** substitutions and deviations not properly submitted and approved or otherwise authorized, **(4)** temporary supports, structures, or construction which will not produce the results required by the Contract Documents, and **(5)** materials or equipment rendered unsuitable for incorporation into the Work due

to improper storage or protection.

J. DIRECTOR: The Director of the Technical Staff of the Alabama Building Commission.

K. DRAWINGS: The Drawings are the portions of the Contract Documents showing graphically the design, location, layout, and dimensions of the Work, in the form of plans, elevations, sections, details, schedules, and diagrams.

L. NOTICE TO PROCEED: A proceed order issued by the Owner or Director, as applicable, fixing the date on which the Contractor shall begin the prosecution of the Work, which is also the date on which the Contract Time shall begin.

M. OWNER: The Owner is the entity or entities identified as such in the Construction Contract and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative. The term "Owner" as used herein shall be synonymous with the term "Awarding Authority" as defined and used in Title 39 - Public Works, Code of Alabama, 1975, as amended.

N. THE PROJECT: The Project is the total construction of which the Work required by these Contract Documents may be the entirety or only a part with other portions to be constructed by the Owner or separate contractors.

O. PROJECT MANUAL: The Project Manual is the volume usually assembled for the Work which may include the Advertisement for Bids, Instructions to Bidders, sample forms, General Conditions of the Contract, Supplementary Conditions, and Specifications of the Work.

P. SPECIFICATIONS: The Specifications are that portion of the Contract Documents which set forth in writing the standards of quality and performance of products, equipment, materials, systems, and services and workmanship required for acceptable performance of the Work.

Q. SUBCONTRACTOR: A Subcontractor is a person or entity who is undertaking the performance of any part of the Work by virtue of a contract with the Contractor. The term "Subcontractor" means a Subcontractor or its authorized representatives.

R. THE WORK: The Work is the construction and services required by the Contract Documents and includes all labor, materials, supplies, equipment, and other items and services as are necessary to produce the required construction and to fulfill the Contractor's obligations under the Contract. The Work may constitute the entire Project or only a portion of it.

ARTICLE 2
INTENT and INTERPRETATION of the CONTRACT DOCUMENTS

A. INTENT

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary

or permanent and whether or not incorporated or to be incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. COMPLEMENTARY DOCUMENTS

The Contract Documents are complementary. If Work is required by one Contract Document, the Contractor shall perform the Work as if it were required by all of the Contract Documents. However, the Contractor shall be required to perform Work only to the extent that is consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

C. ORDER of PRECEDENCE

Should any discrepancy arise between the various elements of the Contract Documents, precedence shall be given to them in the following order unless to do so would contravene the apparent Intent of the Contract Documents stated in preceding Paragraph A:

(1) The Construction Contract.
(2) Addenda, with those of later date having precedence over those of earlier date.
(3) Supplementary Conditions (or other Conditions which modify the General Conditions of the Contract).
(4) General Conditions of the Contract.
(5) The Specifications.
(6) Details appearing on the Drawings; large scale details shall take precedence over smaller scale details.
(7) The Drawings; large scale drawings shall take precedence over smaller scale drawings.

D. ORGANIZATION

Except as may be specifically stated within the technical specifications, neither the organization of the Specifications into divisions, sections, or otherwise, nor any arrangement of the Drawings shall control how the Contractor subcontracts portions of the Work or assigns Work to any trade.

E. INTERPRETATION

(1) The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the Intent of the Contract Documents stated in preceding Paragraph A. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not In Contract" ("N.I.C."), the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor's expense to produce a product or system that is complete, appropriately tested, and in operative condition ready for use or subsequent construction or operation of the Owner or separate contractors. The omission of words or phases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

(2) Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings

unless otherwise indicated.

(3) Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement for Bids.

(4) In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

(5) Generally, portions of the Contract Documents written in longhand take precedence over typed portions, and typed portions take precedence over printed portions.

(6) Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

F. SEVERABILITY.

The partial or complete invalidity of any one or more provision of this Contract shall not affect the validity or continuing force and effect of any other provision.

ARTICLE 3
CONTRACTOR'S REPRESENTATIONS

By executing the Construction Contract the Contractor represents to the Owner:

A. The Contractor has visited the site of the Work to become familiar with local conditions under which the Work is to be performed and to evaluate reasonably observable conditions as compared with requirements of the Contract Documents.

B. The Contractor shall use its best skill and attention to perform the Work in an expeditious manner consistent with the Contract Documents.

C. The Contractor is an independent contractor and in performance of the Contract remains and shall act as an independent contractor having no authority to represent or obligate the Owner in any manner unless authorized by the Owner in writing.

ARTICLE 4
DOCUMENTS FURNISHED to CONTRACTOR

Unless otherwise provided in the Contract Documents, twenty sets of Drawings and Project Manuals will be furnished to the Contractor by the Architect without charge. Other copies requested will be furnished at reproduction cost.

ARTICLE 5
OWNERSHIP of DRAWINGS

All original or duplicated Drawings, Specifications, and other documents prepared by the Architect, and furnished to the Contractor are the property of the Architect and are to be used solely for this Project and not to be used in any manner for other work. Upon completion of the Work, all copies of Drawings and Specifications, with the exception of the Contractor's record set, shall be returned or accounted for by the Contractor to the Architect, on request.

ARTICLE 6
SUPERVISION, SUPERINTENDENT, and EMPLOYEES

A. SUPERVISION and CONSTRUCTION METHODS

(1) The term "Construction Methods" means the construction means, methods, techniques, sequences, and procedures utilized by the Contractor in performing the Work. The Contractor is solely responsible for supervising and coordinating the performance of the Work, including the selection of Construction Methods, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Contractor is solely and completely responsible for job site safety, including the protection of persons and property in accordance with Article 14.

(3) The Contractor shall be responsible to the Owner for acts and omissions of not only the Contractor and its agents and employees, but all persons and entities, and their agents and employees, who are performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

(4) The Contractor shall be responsible to inspect the in-progress and completed Work to verify its compliance with the Contract Documents and to insure that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work.

B. SUPERINTENDENT

(1) The Contractor shall employ and maintain a competent level of supervision for the performance of the Work at the Project site, including a superintendent who shall: **(a)** have full authority to receive instructions from the Architect or Owner and to act on those instructions and **(b)** be present at the Project site at all times during which Work is being performed.

(2) Before beginning performance of the Work, the Contractor shall notify the Architect in writing of the name and qualifications of its proposed superintendent so that the Owner may review the individual's qualifications. If, for reasonable cause, the Owner refuses to approve the individual, or withdraws its approval after once giving it, the Contractor shall name a different superintendent for the Owner's review and approval. Any disapproved superintendent will not perform in that capacity thereafter at the Project site.

C. EMPLOYEES

The Contractor shall permit only fit and skilled persons to perform the Work. The Contractor shall

enforce safety procedures, strict discipline, and good order among persons performing the Work. The Contractor will remove from its employment on the Project any person who deliberately or persistently produces non-conforming Work or who fails or refuses to conform to reasonable rules of personal conduct contained in the Contract Documents or implemented by the Owner and delivered to the Contractor in writing during the course of the Work.

ARTICLE 7
REVIEW of CONTRACT DOCUMENTS and FIELD CONDITIONS by CONTRACTOR

A. In order to facilitate assembly and installation of the Work in accordance with the Contract Documents, before starting each portion of the Work, the Contractor shall examine and compare the relevant Contract Documents, and compare them to relevant field measurements made by the Contractor and any conditions at the site affecting that portion of the Work.

B. If the Contractor discovers any errors, omissions, or inconsistencies in the Contract Documents, the Contractor shall promptly report them to the Architect as a written request for information that includes a detailed statement identifying the specific Drawings or Specifications that are in need of clarification and the error, omission, or inconsistency discovered in them.

(1) The Contractor shall not be expected to act as a licensed design professional and ascertain whether the Contract Documents comply with applicable laws, statutes, ordinances, building codes, and rules and regulations, but the Contractor shall be obligated to promptly notify the Architect of any such noncompliance discovered by or made known to the Contractor. If the Contractor performs Work without fulfilling this notification obligation, the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

(2) The Contractor shall not be liable to the Owner for errors, omissions, or inconsistencies that may exist in the Contract Documents, or between the Contract Documents and conditions at the site, unless the Contractor knowingly fails to report a discovered error, omission, or inconsistency to the Architect, in which case the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

C. If the Contractor considers the Architect's response to a request for information to constitute a change to the Contract Documents involving additional costs and/or time, the Contractor shall follow the procedures of Article 20, Claims for Extra Cost or Extra Work.

D. If, with undue frequency, the Contractor requests information that is obtainable through reasonable examination and comparison of the Contract Documents, site conditions, and previous correspondence, interpretations, or clarifications, the Contractor shall be liable to the Owner for reasonable charges from the Architect for the additional services required to review, research, and respond to such requests for information.

ARTICLE 8
SURVEYS by CONTRACTOR

A. The Contractor shall provide competent engineering services to assure accurate execution of the Work in accordance with the Contract Documents. The Contractor shall verify the figures given for

the contours, approaches and locations shown on the Drawings before starting any Work and be responsible for the accuracy of the finished Work. Without extra cost to the Owner, the Contractor shall engage a licensed surveyor if necessary to verify boundary lines, keep within property lines, and shall be responsible for encroachments on rights or property of public or surrounding property owners.

B. The Contractor shall establish all base lines for the location of the principal components of the Work and make all detail surveys necessary for construction, including grade stakes, batter boards and other working points, lines and elevations. If the Work involves alteration of or addition to existing structures or improvements, the Contractor shall locate and measure elements of the existing conditions as is necessary to facilitate accurate fabrication, assembly, and installation of new Work in the relationship, alignment, and/or connection to the existing structure or improvement as is shown in the Contract Documents.

ARTICLE 9
SUBMITTALS

A. Where required by the Contract Documents, the Contractor shall submit shop drawings, product data, samples and other information (hereinafter referred to as Submittals) to the Architect for the purpose of demonstrating the way by which the Contractor proposes to conform to the requirements of the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

B. The Contractor shall be responsible to the Owner for the accuracy of its Submittals and the conformity of its submitted information to the requirements of the Contract Documents. Each Submittal shall bear the Contractor's approval, evidencing that the Contractor has reviewed and found the information to be in compliance with the requirements of the Contract Documents. Submittals which are not marked as reviewed and approved by the Contractor may be returned by the Architect without action.

C. The Contractor shall prepare and deliver its submittals to the Architect sufficiently in advance of construction requirements and in a sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. In coordinating the Submittal process with its construction schedule, the Contractor shall allow sufficient time to permit adequate review by the Architect.

D. By approving a Submittal the Contractor represents not only that the element of Work presented in the Submittal complies with the requirements of the Contract Documents, but also that the Contractor has:

(1) found the layout and/or dimensions in the Submittal to be comparable with those in the Contract Documents and other relevant Submittals and has made field measurements as necessary to verify their accuracy, and
(2) determined that products, materials, systems, equipment and/or procedures presented in the Submittal are compatible with those presented, or being presented, in other relevant Submittals and with the Contractor's intended Construction Methods.

E. The Contractor shall not fabricate or perform any portion of the Work for which the Contract Documents require Submittals until the respective Submittals have been approved by the Architect.

F. In the case of a resubmission, the Contractor shall direct specific attention to all revisions in a Submittal. The Architect's approval of a resubmission shall not apply to any revisions that were not brought to the Architect's attention.

G. If the Contract Documents specify that a Submittal is to be prepared and sealed by a registered architect or licensed engineer retained by the Contractor, all drawings, calculations, specifications, and certifications of the Submittal shall bear the Alabama seal of registration and signature of the registered/licensed design professional who prepared them or under whose supervision they were prepared. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of such a Submittal, provided that all performance and design criteria that such Submittal must satisfy are sufficiently specified in the Contract Documents. The Architect will review, approve or take other appropriate action on such a Submittal only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria specified in the Contract Documents.

H. DEVIATIONS

(1) The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures of Article 19.

(2) Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

(3) The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

I. ARCHITECT'S REVIEW and APPROVAL

(1) The Architect will review the Contractor's Submittals for conformance with requirements of, and the design concept expressed in, the Contract Documents and will approve or take other appropriate action upon them. This review is not intended to verify the accuracy and completeness of details such as dimensions and quantities nor to substantiate installation instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor. However, the Architect shall advise the Contractor of any errors or omissions which the Architect may detect during this review. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(2) The Architect will review and respond to all Submittals with reasonable promptness to avoid delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time to permit adequate review.

(3) No corrections or changes to Submittals indicated by the Architect will be considered as authorizations to perform Extra Work. If the Contractor considers such correction or change of a Submittal to require Work which differs from the requirements of the Contract Documents, the Contractor shall promptly notify the Architect in writing in accordance with Article 20, Claims for Extra Cost or Extra Work.

J. CONFORMANCE with SUBMITTALS

The Work shall be constructed in accordance with approved Submittals.

ARTICLE 10
DOCUMENTS and SAMPLES at the SITE

A. "AS ISSUED" SET

The Contractor shall maintain at the Project site, in good order, at least one copy of all Addenda, Change Orders, supplemental drawings, written directives and clarifications, and approved Submittals intact as issued, and an updated construction schedule.

B. "POSTED" SET

The Contractor shall maintain at the Project site, in good order, at least one set of the Drawings and Project Manual into which the Contractor has "posted"(incorporated) all Addenda, Change Orders, supplemental drawings, clarifications, and other information pertinent to the proper performance of the Work. The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are "posted" with the current information to insure that updated Contract Documents are used for performance of the Work.

C. RECORD SET

One set of the Drawings and Project Manual described in Paragraph B shall be the Contractor's record set in which the Contractor shall record all field changes, corrections, selections, final locations, and other information as will be duplicated on the "As-built" documents required under Article 11. The Contractor shall record such "as-built" information in its record set as it becomes available through progress of the Work. The Contractor's performance of this requirement shall be subject to confirmation by the Architect at any time as a prerequisite to approval of Progress Payments.

D. The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, BC Project Inspector, and their representatives.

ARTICLE 11
"AS-BUILT" DOCUMENTS

A. Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets of "As-built" documents, as described herein, to the Architect for submission to the Owner upon completion of the Work. Each set of "As-built' documents shall consist of a copy of the Drawings and Project Manual, in like-new condition, into which the Contractor has neatly incorporated all Addenda, Change Orders, supplemental drawings, clarifications, field changes, corrections, selections, actual locations of underground utilities, and other information as required herein or specified elsewhere in the Contract Documents.

B. The Contractor shall use the following methods for incorporating information into the "As-built" documents:

(1) Drawings

(a) To the greatest extent practicable, information shall be carefully drawn and lettered, in ink, on the Drawings in the form of sketches, details, plans, notes, and dimensions as required to provide a fully dimensioned record of the Work. When required for clarity, sketches, details, or partial plans shall be drawn on supplemental sheets and bound into the Drawings and referenced on the drawing being revised.

(b) Where a revised drawing has been furnished by the Architect, the drawing of latest date shall be bound into the Drawings in the place of the superseded drawing.

(c) Where a supplemental drawing has been furnished by the Architect, the supplemental drawing shall be bound into the Drawings in an appropriate location and referred to by notes added to the drawing being supplemented.

(d) Where the Architect has furnished details, partial plans, or lengthy notes of which it would be impractical for the Contractor to redraw or letter on a drawing, such information may be affixed to the appropriate drawing with transparent tape if space is available on the drawing.

(e) Any entry of information made in the Drawings that is the result of an Addendum or Change Order, shall identify the Addendum or Change Order from which it originated.

(2) Project Manual

(a) A copy of all Addenda and Change Orders, excluding drawings thereof, shall be bound in the front of the Project Manual.

(b) Where a document, form, or entire specification section is revised, the latest issue shall be bound into the Project Manual in the place of the superseded issue.

(c) Where information within a specification section is revised, the deleted or revised information shall be drawn through in ink and an adjacent note added identifying the Addendum or Change Order containing the revised information.

C. Within ten days after the Date of Substantial Completion of the Work, or the last completed portion of the Work, the Contractor shall submit the "As-built" documents to the Architect for approval. If the Architect requires that any corrections be made, the documents will be returned in a reasonable time for correction and resubmission.

ARTICLE 12
PROGRESS SCHEDULE

(Not applicable if the Contract Time is 60 days or less.)

A. The Contractor shall within fifteen days after the date of commencement stated in the Notice to Proceed, or such other time as may be provided in the Contract Documents, prepare and submit to

the Architect for review and approval a practicable construction schedule informing the Architect and Owner of the order in which the Contractor plans to carry on the Work within the Contract Time. The Architect's review and approval of the Contractor's construction schedule shall be only for compliance with the specified format, Contract Time, and suitability for monitoring progress of the Work and shall not be construed as a representation that the Architect has analyzed the schedule to form opinions of sequences or durations of time represented in the schedule.

B. If a schedule format is not specified elsewhere in the Contract Documents, the construction schedule shall be prepared using ABC' Form C-11, "Progress Schedule and Report", (contained in the Project Manual) or similar format of suitable scale and detail to indicate the percentage of Work scheduled to be completed at the end of each month. At the end of each month the Contractor shall enter the actual percentage of completion on the construction schedule submit two copies to the Architect, and attach one copy to each copy of the monthly Application for Payment. The construction schedule shall be revised to reflect any agreed extensions of the Contract Time or as required by conditions of the Work.

C. If a more comprehensive schedule format is specified elsewhere in the Contract Documents or voluntarily employed by the Contractor, ABC Form C-11 shall also be prepared, updated, and submitted as described in preceding Paragraph B.

D. The Contractor's construction schedule shall be used by the Contractor, Architect, and Owner to determine the adequacy of the Contractor's progress. The Contractor shall be responsible for maintaining progress in accordance with the currently approved construction schedule and shall increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant and equipment as may be necessary to do so. If the Contractor's progress falls materially behind the currently approved construction schedule and, in the opinion of the Architect or Owner, the Contractor is not taking sufficient steps to regain schedule, the Architect may, with the Owner's concurrence, issue the Contractor a Notice to Cure pursuant to Article 27. In such a Notice to Cure the Architect may require the Contractor to submit such supplementary or revised construction schedules as may be deemed necessary to demonstrate the manner in which schedule will be regained.

ARTICLE 13
EQUIPMENT, MATERIALS, and SUBSTITUTIONS

A. Every part of the Work shall be executed in a workmanlike manner in accordance with the Contract Documents and approved Submittals. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work and shall be new except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise.

B. Whenever a product, material, system, item of equipment, or service is identified in the Contract Documents by reference to a trade name, manufacturer's name, model number, etc.(hereinafter referred to as "source"), and only one or two sources are listed, or three or more sources are listed and followed by "or approved equal" or similar wording, it is intended to establish a required standard of performance, design, and quality, and the Contractor may submit, for the Architect's approval, products, materials, systems, equipment, or services of other sources which the Contractor can prove to the Architect's satisfaction are equal to, or exceed, the standard of

performance, design and quality specified, unless the provisions of Paragraph D below apply. Such proposed substitutions are not to be purchased or installed without the Architect's written approval of the substitution.

C. If the Contract Documents identify three or more sources for a product, material, system, item of equipment or service to be used and the list of sources is not followed by "or approved equal" or similar wording, the Contractor may make substitution only after evaluation by the Architect and execution of an appropriate Contract Change Order.

D. If the Contract Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the Contractor must furnish the identified sole source.

ARTICLE 14
SAFETY and PROTECTION of PERSONS and PROPERTY

A. The Contractor shall be solely and completely responsible for conditions at the Project site, including safety of all persons (including employees) and property. The Contractor shall create, maintain, and supervise conditions and programs to facilitate and promote safe execution of the Work, and shall supervise the Work with the attention and skill required to assure its safe performance. Safety provisions shall conform to OSHA requirements and all other federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. Nothing contained in this Contract shall be construed to mean that the Owner has employed the Architect nor has the Architect employed its consultants to administer, supervise, inspect, or take action regarding safety programs or conditions at the Project site.

B. The Contractor shall employ Construction Methods, safety precautions, and protective measures that will reasonably prevent damage, injury or loss to:

(1) workers and other persons on the Project site and in adjacent and other areas that may be affected by the Contractor's operations;

(2) the Work and materials and equipment to be incorporated into the Work and stored by the Contractor on or off the Project site; and

(3) other property on, or adjacent to, the Project site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and other improvements not designated in the Contract Documents to be removed, relocated, or replaced.

C. The Contractor shall be responsible for the prompt remedy of damage and loss to property, including the filing of appropriate insurance claims, caused in whole or in part by the fault or negligence of the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

D. The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety and protection of persons or property, including without limitation notices to adjoining property owners of excavation or other construction activities that potentially could cause damage or injury to adjoining property or persons thereon.

E. The Contractor shall erect and maintain barriers, danger signs, and any other reasonable safeguards and warnings against hazards as may be required for safety and protection during performance of the Contract and shall notify owners and users of adjacent sites and utilities of conditions that may exist or arise which may jeopardize their safety.

F. If use or storage of explosives or other hazardous materials or equipment or unusual Construction Methods are necessary for execution of the Work, the Contractor shall exercise commensurate care and employ supervisors and workers properly qualified to perform such activity.

G. The Contractor shall furnish a qualified safety representative at the Project site whose duties shall include the prevention of accidents. The safety representative shall be the Contractor's superintendent, unless the Contractor assigns this duty to another responsible member of its on-site staff and notifies the Owner and Architect in writing of such assignment.

H. The Contractor shall not permit a load to be applied, or forces introduced, to any part of the construction or site that may cause damage to the construction or site or endanger safety of the construction, site, or persons on or near the site.

I. The Contractor shall have the right to act as it deems appropriate in emergency situations jeopardizing life or property. The Contractor shall be entitled to equitable adjustment of the Contract Sum or Contract Time for its efforts expended for the sole benefit of the Owner in an emergency. Such adjustment shall be determined as provided in Articles 19 and 20.

J. The duty of the Architect and the Architect's consultants to visit the Project site to conduct periodic inspections of the Work or for other purposes shall not give rise to a duty to review or approve the adequacy of the Contractor's safety program, safety supervisor, or any safety measure which Contractor takes or fails to take in, on, or near the Project site.

ARTICLE 15
HAZARDOUS MATERIALS

A. A Hazardous Material is any substance or material identified as hazardous under any federal, state, or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing its handling, disposal, and/or clean-up. Existing Hazardous Materials are Hazardous Materials discovered at the Project site and not introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

B. If, during the performance of the Work, the Contractor encounters a suspected Existing Hazardous Material, the Contractor shall immediately stop work in the affected area, take measures appropriate to the condition to keep people away from the suspected Existing Hazardous Material, and immediately notify the Architect and Owner of the condition in writing.

C. The Owner shall obtain the services of an independent laboratory or professional consultant, appropriately licensed and qualified, to determine whether the suspected material is a Hazardous Material requiring abatement and, if so, to certify after its abatement that it has been rendered harmless. Any abatement of Existing Hazardous Materials will be the responsibility of the Owner. The Owner will advise the Contractor in writing of the persons or entities who will determine the

nature of the suspected material and those who will, if necessary, perform the abatement. The Owner will not employ persons or entities to perform these services to whom the Contractor or Architect has reasonable objection.

D. After certification by the Owner's independent laboratory or professional consultant that the material is harmless or has been rendered harmless, work in the affected area shall resume upon written agreement between the Owner and Contractor. If the material is found to be an Existing Hazardous Material and the Contractor incurs additional cost or delay due to the presence and abatement of the material, the Contract Sum and/or Contract Time shall be appropriately adjusted by a Contract Change Order pursuant to Article 19.

E. The Owner shall not be responsible for Hazardous Materials introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable unless such Hazardous Materials were required by the Contract Documents.

ARTICLE 16
INSPECTION of the WORK

A. GENERAL

(1) The Contractor is solely responsible for the Work's compliance with the Contract Documents; therefore, the Contractor shall be responsible to inspect in-progress and completed Work, and shall verify its compliance with the Contract Documents and that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work. Neither the presence nor absence of inspections by the Architect, Owner, Director, BC Project Inspector, any public authority having jurisdiction, or their representatives shall relieve the Contractor of responsibility to inspect the Work, for responsibility for Construction Methods and safety precautions and programs in connection with the Work, or from any other requirement of the Contract Documents.

(2) The Architect, Owner, Director, BC Project Inspector, any public authority having jurisdiction, and their representatives shall have access at all times to the Work for inspection whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. All materials, workmanship, processes of manufacture, and methods of construction, if not otherwise stipulated in the Contract Documents, shall be subject to inspection, examination, and test at any and all places where such manufacture and/or construction are being carried on. Such inspections will not unreasonably interfere with the Contractor's operations.

(3) The Architect will inspect the Work as a representative of the Owner. The Architect's inspections may be supplemented by inspections by the BC Project Inspector as a representative of the Alabama Building Commission.

(4) The Contractor may be charged by the Owner for any extra cost of inspection incurred by the Owner or Architect on account of material and workmanship not being ready at the time of inspection set by the Contractor.

B. TYPES of INSPECTIONS

(1) SCHEDULED INSPECTIONS and CONFERENCES. Scheduled Inspections and Conferences are conducted by the Architect, scheduled by the Architect in coordination with the Contractor and BC Project Inspector, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers, and the BC Project Inspector. Scheduled Inspections and Conferences of this Contract include:

(a) Pre-construction Conference.

(b) Pre-roofing Conference (not applicable if the Contract involves no roofing work)

(c) Above Ceiling Inspection(s): An above ceiling inspection of all spaces in the building is required before the ceiling material is installed. Above ceiling inspections are to be conducted at a time when all above ceiling systems are complete and tested to the greatest extent reasonable pending installation of the ceiling material. System identifications and markings are to be complete. All fire-rated construction including fire-stopping of penetrations and specified identification above the ceiling shall be complete. Ceiling framing and suspension systems shall be complete with lights, grilles and diffusers, access panels, fire protection drops for sprinkler heads, etc., installed in their final locations to the greatest extent reasonable. Above ceiling framing to support ceiling mounted equipment shall be complete. The above ceiling construction shall be complete to the extent that after the inspection the ceiling material can be installed without disturbance.

(d) Final Inspection(s): A Final Inspection shall establish that the Work, or a designated portion of the Work, is Substantially Complete in accordance with Article 32 and is accepted by the Architect, Owner, and BC Project Inspector as being ready for the Owner's occupancy or use. At the conclusion of this inspection, items requiring correction or completion ("punch list" items) shall be minimal and require only a short period of time for accomplishment to establish Final Acceptance of the Work. If the Work, or designated portion of the Work, includes the installation, or modification, of a fire alarm system or other life safety systems essential to occupancy, such systems shall have been tested and appropriately certified before the Final Inspection.

(e) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one year warranty period(s). The subsequent delivery of the Architect's report of this inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period in accordance with Article 35.

(2) PERIODIC INSPECTIONS. Periodic Inspections are conducted throughout the course of the Work by the Architect, the Architect's consultants, their representatives, and the BC Project Inspector, jointly or independently, with or without advance notice to the Contractor.

(3) SPECIFIED INSPECTIONS and TESTS. Specified Inspections and Tests include inspections, tests, demonstrations, and approvals that are either specified in the Contract Documents or required by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction, to be performed by the Contractor, one of its Subcontractors, or an independent testing laboratory or firm (whether paid for by the Contractor or Owner).

C. INSPECTIONS by the ARCHITECT

(1) The Architect is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations as defined in Article 9 and "minor" changes as defined in Article 19), to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner.

(2) The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations and as otherwise necessary to:

(a) become generally familiar with the in-progress and completed Work and the quality of the Work,

(b) determine whether the Work is progressing in general accordance with the Contractor's schedule and is likely to be completed within the Contract Time,

(c) visually compare readily accessible elements of the Work to the requirements of the Contract Documents to determine, in general, if the Contractor's performance of the Work indicates that the Work will conform to the requirements of the Contract Documents when completed,

(d) endeavor to guard the Owner against Defective Work,

(e) review and address with the Contractor any problems in implementing the requirements of the Contract Documents that the Contractor may have encountered, and

(f) keep the Owner fully informed about the Project.

(3) The Architect shall have the authority to reject Defective Work or require its correction, but shall not be required to make exhaustive investigations or examinations of the in-progress or completed portions of the Work to expose the presence of Defective Work. However, it shall be an obligation of the Architect to report in writing, to the Owner, Contractor, and BC Project Inspector, any Defective Work recognized by the Architect.

(4) The Architect shall have the authority to require the Contractor to stop work only when, in the Architect's reasonable opinion, such stoppage is necessary to avoid Defective Work. The Architect shall not be liable to the Contractor or Owner for the consequences of any decisions made by the Architect in good faith either to exercise or not to exercise this authority.

(5) "Inspections by the Architect" includes appropriate inspections by the Architect's consultants as dictated by their respective disciplines of design and the stage of the Contractor's operations.

D. INSPECTIONS by the BC PROJECT INSPECTOR

(1) The BC Project Inspector will:

(a) participate in scheduled inspections and conferences as practicable,

(b) perform periodic inspections of in-progress and completed Work to ensure code compliance of the Project and general conformance of the Work with the Contract Documents, and

(c) monitor the Contractor's progress and performance of the Work.

(2) The BC Project Inspector shall have the authority to:

(a) reject Work that is not in compliance with the State Building Code adopted by the Commission, unless the Work is in accordance with the Contract Documents in which case the BC Project Inspector will advise the Architect to initiate appropriate corrective action, and

(b) notify the Architect, Owner, and Contractor of Defective Work recognized by the BC Project Inspector.

(3) The BC Project Inspector's periodic inspections will usually be scheduled around key stages of construction based upon information reported by the Architect. As the Architect or Owner

deems appropriate, the BC Project Inspector, as well as other members of the Technical Staff, can be requested to schedule special inspections or meetings to address specific matters. The written findings of BC Project Inspector will be transmitted to the Owner, Contractor, and Architect.

(4) The BC Project Inspector is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents, to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner. The Contractor shall not proceed with Work as a result of instructions or findings of the BC Project Inspector which the Contractor considers to be a change to the requirements of the Contract Documents without written authorization of the Owner through the Architect.

E. UNCOVERING WORK

(1) If the Contractor covers a portion of the Work before it is examined by the Architect and this is contrary to the Architect's request or specific requirements in the Contract Documents, then, upon written request of the Architect, the Work must be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

(2) Without a prior request or specific requirement that Work be examined by the Architect before it is covered, the Architect may request that Work be uncovered for examination and the Contractor shall uncover it. If the Work is in accordance with the Contract Documents, the Contract Sum shall be equitably adjusted under Article 19 to compensate the Contractor for the costs of uncovering and replacement. If the Work is not in accordance with the Contract Documents, uncovering, correction, and replacement shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

F. SPECIFIED INSPECTIONS and TESTS

(1) The Contractor shall schedule and coordinate Specified Inspections and Tests to be made at appropriate times so as not to delay the progress of the Work or the work of the Owner or separate contractors. If the Contract Documents require that a Specified Inspection or Test be witnessed or attended by the Architect or Architect's consultant, the Contractor shall give the Architect timely notice of the time and place of the Specified Inspection or Test. If a Specified Inspection or Test reveals that Work is not in compliance with requirements of the Contract Documents, the Contractor shall bear the costs of correction, repeating the Specified Inspection or Test, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services. Through appropriate Contract Change Order the Owner shall bear costs of tests, inspections or approvals which become Contract requirements subsequent to the receipt of bids.

(2) If the Architect, Owner, or public authority having jurisdiction determines that inspections, tests, demonstrations, or approvals in addition to Specified Inspections and Tests are required, the Contractor shall, upon written instruction from the Architect, arrange for their performance by an entity acceptable to the Owner, giving timely notice to the architect of the time and place of their performance. Related costs shall be borne by the Owner unless the procedures reveal that Work is not in compliance with requirements of the Contract Documents, in which case the Contractor shall bear the costs of correction, repeating the procedures, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services.

(3) Unless otherwise required by the Contract Documents, required certificates of Specified Inspections and Tests shall be secured by the Contractor and promptly delivered to the Architect.

(4) Failure of any materials to pass Specified Inspections and Tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material for use in the Work.

ARTICLE 17
CORRECTION of DEFECTIVE WORK

A. The Contractor shall, at the Contractor's expense, promptly correct Defective Work rejected by the Architect or which otherwise becomes known to the Contractor, removing the rejected or nonconforming materials and construction from the project site.

B. Correction of Defective Work shall be performed in such a timely manner as will avoid delay of completion, use, or occupancy of the Work and the work of the Owner and separate contractors.

C. The Contractor shall bear all expenses related to the correction of Defective Work, including but not limited to: **(1)** additional testing and inspections, including repeating Specified Inspections and Tests, **(2)** reasonable services and expenses of the Architect, and **(3)** the expense of making good all work of the Contractor, Owner, or separate contractors destroyed or damaged by the correction of Defective Work.

ARTICLE 18
DEDUCTIONS for UNCORRECTED WORK

If the Owner deems it advisable and in the Owner's interest to accept Defective Work, the Owner may allow part or all of such Work to remain in place, provided an equitable deduction from the Contract Sum, acceptable to the Owner, is offered by the Contractor.

ARTICLE 19
CHANGES in the WORK

A. GENERAL

(1) The Owner may at any time direct the Contractor to make changes in the Work which are within the general scope of the Contract, including changes in the Drawings, Specifications, or other portions of the Contract Documents to add, delete, or otherwise revise portions of the Work. The Architect is authorized by the Owner to direct "minor" changes in the Work by written order to the Contractor. "Minor" changes in the Work are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Changes in the Work which are not "minor" may be authorized only by the Owner.

(2) If the Owner directs a change in the Work, the change shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract, stating their agreement upon the change or changes in the Work and the adjustments, if any, in the Contract Sum and the Contract Time.

(3) Subject to compliance with Alabama's Public Works Law, the Owner may, upon agreement by the Contractor, incorporate previously unawarded bid alternates into the Contract.

(4) In the event of a claim or dispute as to the appropriate adjustment to the Contract Sum or Contract Time due to a directive to make changes in the Work, the Work shall proceed as provided in this article subject to subsequent agreement of the parties or final resolution of the dispute pursuant to Article 24.

(5) Consent of surety will be obtained for all Contract Change Orders involving an increase in the Contract Sum.

(6) Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly to perform changes in the Work, unless otherwise directed by the Owner through the Architect.

B. DETERMINATION of ADJUSTMENT of the CONTRACT SUM

The adjustment of the Contract Sum resulting from a change in the Work shall be determined by one of the following methods, or a combination thereof, as selected by the Owner:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(2) Unit Price. By application of Unit Prices included in the Contract or subsequently agreed to by the parties. However, if the character or quantity originally contemplated is materially changed so that application of such unit price to quantities of Work proposed will cause substantial inequity to either party, the applicable unit price shall be equitably adjusted.

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under

Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

C. ADJUSTMENT of the CONTRACT TIME due to CHANGES

(1) Unless otherwise provided in the Contract Documents, the Contract Time shall be equitably adjusted for the performance of a change provided that the Contractor notifies the Architect in writing that the change will increase the time required to complete the Work. Such notice shall be provided no later than:

(a) with the Contractor's cost proposal stating the number of days of extension requested, or

(b) within ten days after the Contractor receives a directive to proceed with a change in advance of submitting a cost proposal, in which case the notice should provide an estimated number of days of extension to be requested, which may be subject to adjustment in the cost proposal.

(2) The Contract Time shall be extended only to the extent that the change affects the time required to complete the entire Work of the Contract, taking into account the concurrent performance of the changed and unchanged Work.

D. CHANGE ORDER PROCEDURES

(1) If the Owner proposes to make a change in the Work, the Architect will request that the Contractor provide a cost proposal for making the change to the Work. The request shall be in writing and shall adequately describe the proposed change using drawings, specifications, narrative, or a combination thereof. Within 21 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit to the Architect a written proposal, properly itemized and supported by sufficient substantiating data to facilitate evaluation. The stated time within which the Contractor must submit a proposal may be extended if, within that time, the Contractor makes a written request with reasonable justification thereof.

(2) The Contractor may voluntarily offer a change proposal which, in the Contractor's opinion, will reduce the cost of construction, maintenance, or operation or will improve the cost-effective performance of an element of the Project, in which case the Owner, through the Architect, will

accept, reject, or respond otherwise within 21 days after receipt of the proposal, or such other reasonable time as the Contractor may state in the proposal.

(3) If the Contractor's proposal is acceptable to the Owner, or is negotiated to the mutual agreement of the Contractor and Owner, the Architect will prepare an appropriate Contract Change Order for execution. Upon receipt of the fully executed Contract Change Order, the Contractor shall proceed with the change.

(4) In advance of delivery of a fully executed Contract Change Order, the Architect may furnish to the Contractor a written authorization to proceed with an agreed change. However, such an authorization shall be effective only if it:

(a) identifies the Contractor's accepted or negotiated proposal for the change,
(b) states the agreed adjustments, if any, in Contract Sum and Contract Time,
(c) states that funds are available to pay for the change, and
(d) is signed by the Owner.

(5) If the Contractor and Owner cannot agree on the amount of the adjustment in the Contract Sum for a change, the Owner, through the Architect, may order the Contractor to proceed with the change on a Force Account basis, but the net cost to the Owner shall not exceed the amount quoted in the Contractor's proposal. Such order shall state that funds are available to pay for the change.

(6) If the Contractor does not promptly respond to a request for a proposal, or the Owner determines that the change is essential to the final product of the Work and that the change must be effected immediately to avoid delay of the Project, the Owner may:

(a) determine with the Contractor a sufficient maximum amount to be authorized for the change and

(b) direct the Contractor to proceed with the change on a Force Account basis pending delivery of the Contractor's proposal, stating the maximum increase in the Contract Sum that is authorized for the change.

(7) Pending agreement of the parties or final resolution of any dispute of the total amount due the Contractor for a change in the Work, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by an interim Change Order indicating the parties' agreement with part of all of such costs or time extension. Once a dispute is resolved, it shall be implemented by preparation and execution of an appropriate Change Order.

ARTICLE 20
CLAIMS for EXTRA COST or EXTRA WORK

A. If the Contractor considers any instructions by the Architect, Owner, BC Project Inspector, or public authority having jurisdiction to be contrary to the requirements of the Contract Documents and will involve extra work and/or cost under the Contract, the Contractor shall give the Architect written notice thereof within ten days after receipt of such instructions, and in any event before proceeding to execute such work. As used in this Article, "instructions" shall include written or oral clarifications, directions, instructions, interpretations, or determinations.

B. The Contractor's notification pursuant to Paragraph 20.A shall state: (1) the date, circumstances,

and source of the instructions, **(2)** that the Contractor considers the instructions to constitute a change to the Contract Documents and why, and **(3)** an estimate of extra cost and time that may be involved to the extent an estimate may be reasonably made at that time.

C. Except for claims relating to an emergency endangering life or property, no claim for extra cost or extra work shall be considered in the absence of prior notice required under Paragraph 20.A.

D. Within ten days of receipt of a notice pursuant to Paragraph 20.A, the Architect will respond in writing to the Contractor, stating one of the following:

(1) The cited instruction is rescinded.

(2) The cited instruction is a change in the Work and in which manner the Contractor is to proceed with procedures of Article 19, Changes in the Work.

(3) The cited instruction is reconfirmed, is not considered by the Architect to be a change in the Contract Documents, and the Contractor is to proceed with Work as instructed.

E. If the Architect's response to the Contractor is as in Paragraph 20.D(3), the Contractor shall proceed with the Work as instructed. If the Contractor continues to consider the instructions to constitute a change in the Contract Documents, the Contractor shall, within ten days after receiving the Architect's response, notify the Architect in writing that the Contractor intends to submit a claim pursuant to Article 24, Resolution of Claims and Disputes

ARTICLE 21
DIFFERING SITE CONDITIONS

A. DEFINITION

"Differing Site Conditions" are:

(1) subsurface or otherwise concealed physical conditions at the Project site which differ materially from those indicated in the Contract Documents, or

(2) unknown physical conditions at the Project site which are of an unusual nature, differing materially from conditions ordinarily encountered and generally recognized as inherent in construction activities of the character required by the Contract Documents.

B. PROCEDURES

If Differing Site Conditions are encountered, then the party discovering the condition shall promptly notify the other party before the condition is disturbed and in no event later than ten days after discovering the condition. Upon such notice and verification that a Differing Site Condition exists, the Architect will, with reasonable promptness and with the Owner's concurrence, make changes in the Drawings and/or Specifications as are deemed necessary to conform to the Differing Site Condition. Any increase or decrease in the Contract Sum or Contract Time that is warranted by the changes will be made as provided under Article 19, Changes in the Work. If the Architect determines a Differing Site Condition has not been encountered, the Architect shall notify the Owner and Contractor in writing, stating the reason for that determination.

ARTICLE 22
CLAIMS for DAMAGES

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time after the discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

ARTICLE 23
DELAYS

A. A delay beyond the Contractor's control at any time in the commencement or progress of Work by an act or omission of the Owner, Architect, or any separate contractor or by labor disputes, unusual delay in deliveries, unavoidable casualties, fires, abnormal floods, tornadoes, or other cataclysmic events of nature, may entitle the Contractor to an extension of the Contract Time provided, however, that the Contractor shall, within ten days after the delay first occurs, give written notice to the Architect of the cause of the delay and its probable effect on progress of the entire Work.

B. Adverse weather conditions that are more severe than anticipated for the locality of the Work during any given month may entitle the Contractor to an extension of Contract Time provided, however;

(1) the weather conditions had an adverse effect on construction scheduled to be performed during the period in which the adverse weather occurred, which in reasonable sequence would have an effect on completion of the entire Work,

(2) the Contractor shall, within twenty-one days after the end of the month in which the delay occurs, give the Architect written notice of the delay that occurred during that month and its probable effect on progress of the Work, and

(3) within a reasonable time after giving notice of the delay, the Contractor provides the Architect with sufficient data to document that the weather conditions experienced were unusually severe for the locality of the Work during the month in question. Unless otherwise provided in the Contract Documents, data documenting unusually severe weather conditions shall compare actual weather conditions to the average weather conditions for the month in question during the previous five years as recorded by the National Oceanic and Atmospheric Administration (NOAA) or similar record-keeping entities.

C. Adjustments, if any, of the Contract Time pursuant to this Article shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract or, at closeout of the Contract, by mutual written agreement between the Contractor and Owner. The adjustment of the Contract Time shall not exceed the extent to which the delay extends the time required to complete the entire Work of the Contract.

D. The Contractor shall not be entitled to any adjustment of the Contract Sum for damage due to

delays claimed pursuant to this Article unless the delay was caused by the Owner or Architect and was either:

(1) the result of bad faith or active interference or

(2) beyond the contemplation of the parties and not remedied within a reasonable time after notification by the Contractor of its presence.

ARTICLE 24
RESOLUTION of CLAIMS and DISPUTES

A. APPLICABILITY of ARTICLE

(1) As used in this Article, "Claims and Disputes" include claims or disputes asserted by the Contractor, its Surety, or Owner arising out of or related to the Contract, or its breach, including without limitation claims seeking, under the provisions of the Contract, equitable adjustment of the Contract Sum or Contract Time and claims and disputes arising between the Contractor (or its Surety) and Owner regarding interpretation of the Contract Documents, performance of the Work, or breach of or compliance with the terms of the Contract.

(2) "Resolution" addressed in this Article applies only to Claims and Disputes arising between the Contractor (or its Surety) and Owner and asserted after execution of the Construction Contract and prior to the date upon which final payment is made. Upon making application for final payment the Contractor may reserve the right to subsequent Resolution of existing Claims by including a list of all Claims, in stated amounts, which remain to be resolved and specifically excluding them from any release of claims executed by the Contractor, and in that event Resolution may occur after final payment is made.

B. CONTINUANCE of PERFORMANCE

An unresolved Claim or Dispute shall not be just cause for the Contractor to fail or refuse to proceed diligently with performance of the Contract or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

C. GOOD FAITH EFFORT to SETTLE

The Contractor and Owner agree that, upon the assertion of a Claim by the other, they will make a good faith effort, with the Architect's assistance and advice, to achieve mutual resolution of the Claim. If mutually agreed, the Contractor and Owner may endeavor to resolve a Claim through mediation. If efforts to settle are not successful, the Claim shall be resolved in accordance with paragraph D or E below, whichever applies.

D FINAL RESOLUTION for STATE-FUNDED CONTRACTS

(1) If the Contract is funded in whole or in part with state funds, the final Resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner shall be by the Director, whose decision shall be final, binding, and conclusive upon the Contractor, its Surety, and the Owner.

(2) When it becomes apparent to the party asserting a Claim (the Claimant) that an impasse to

mutual resolution has been reached, the Claimant may request in writing to the Director that the Claim be resolved by decision of the Director. Such request by the Contractor (or its Surety) shall be submitted through the Owner. Should the Owner fail or refuse to submit the Contractor's request within ten days of receipt of same, the Contractor may forward such request directly to the Director. Upon receipt of a request to resolve a Claim, the Director will instruct the parties as to procedures to be initiated and followed.

(3) If the respondent to a Claim fails or refuses to participate or cooperate in the Resolution procedures to the extent that the Claimant is compelled to initiate legal proceedings to induce the Respondent to participate or cooperate, the Claimant will be entitled to recover, and may amend its Claim to include, the expense of reasonable attorney's fees so incurred.

E. FINAL RESOLUTION for LOCALLY-FUNDED CONTRACTS

If the Contract is funded in whole with funds provided by a city or county board of education or other local governmental authority and the Contract Documents do not stipulate a binding alternative dispute resolution method, the final resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner may be by any legal remedy available to the parties. Alternatively, upon the written agreement of the Contractor (or its Surety) and the Owner, final Resolution of Claims and Disputes may be by submission to binding arbitration before a neutral arbitrator or panel or by submission to the Director in accordance with preceding Paragraph D.

ARTICLE 25
OWNER'S RIGHT to CORRECT DEFECTIVE WORK

If the Contractor fails or refuses to correct Defective Work in a timely manner that will avoid delay of completion, use, or occupancy of the Work or work by the Owner or separate contractors, the Architect may give the Contractor written Notice to Cure the Defective Work within a reasonable, stated time. If within ten days after receipt of the Notice to Cure the Contractor has not proceeded and satisfactorily continued to cure the Defective Work or provided the Architect with written verification that satisfactory positive action is in process to cure the Defective Work, the Owner may, without prejudice to any other remedy available to the Owner, correct the Defective Work and deduct the actual cost of the correction from payment then or thereafter due to the Contractor.

ARTICLE 26
OWNER'S RIGHT to STOP or SUSPEND the WORK

A. STOPPING the WORK for CAUSE

If the Contractor fails to correct Defective Work or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may direct the Contractor in writing to stop the Work, or any part of the Work, until the cause for the Owner's directive has been eliminated; however, the Owner's right to stop the Work shall not be construed as a duty of the Owner to be exercised for the benefit of the Contractor or any other person or entity.

B. SUSPENSION by the OWNER for CONVENIENCE

(1) The Owner may, at any time and without cause, direct the Contractor in writing to suspend, delay or interrupt the Work, or any part of the Work, for a period of time as the Owner may determine.

(2) The Contract Sum and Contract Time shall be adjusted, pursuant to Article 19, for reasonable increases in the cost and time caused by an Owner-directed suspension, delay or interruption of Work for the Owner's convenience. However, no adjustment to the Contract Sum shall be made to the extent that the same or concurrent Work is, was or would have been likewise suspended, delayed or interrupted for other reasons not caused by the Owner.

ARTICLE 27
OWNER'S RIGHT to TERMINATE CONTRACT

A. TERMINATION by the OWNER for CAUSE

(1) Causes: The Owner may terminate the Contractor's right to complete the Work, or any designated portion of the Work, if the Contractor:

(a) should be adjudged bankrupt, or should make a general assignment for the benefit of the Contractor's creditors, or if a receiver should be appointed on account of the Contractor's insolvency to the extent termination for these reasons is permissible under applicable law;

(b) refuses or fails to prosecute the Work, or any part of the Work, with the diligence that will insure its completion within the Contract Time, including any extensions, or fails to complete the Work within the Contract Time;

(c) refuses or fails to perform the Work, including prompt correction of Defective Work, in a manner that will insure that the Work, when fully completed, will be in accordance with the Contract Documents;

(d) fails to pay for labor or materials supplied for the Work or to pay Subcontractors in accordance with the respective Subcontract;

(e) persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction, or the instructions of the Architect or Owner; or

(f) is otherwise guilty of a substantial breach of the Contract.

(2) Procedure for Unbonded Construction Contracts (Generally, contracts less than $50,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor written notice to cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor written notice that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a seven day Notice of Termination

without giving the Contractor another Notice to Cure.

(d) At the expiration of the seven days of the termination notice, the Owner may:

.1 take possession of the site, of all materials and equipment stored on and off site, and of all Contractor-owned tools, construction equipment and machinery, and facilities located at the site, and

.2 finish the Work by whatever reasonable method the Owner may deem expedient.

(e) The Contractor shall not be entitled to receive further payment under the Contract until the Work is completed.

(f) If the Owner's cost of completing the Work, including correction of Defective Work, compensation for additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees due to the default and termination, is less than the unpaid balance of the Contract Sum, the excess balance less liquidated damages for delay shall be paid to the Contractor. If such cost to the Owner including attorney's fees, plus liquidated damages, exceeds the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner. Final Resolution of any claim or Dispute involving the termination or any amount due any party as a result of the termination shall be pursuant to Article 24.

(g) Upon the Contractor's request, the Owner shall furnish to the Contractor a detailed accounting of the Owner's cost of completing the Work.

(3) Procedure for Bonded Construction Contracts (Generally, contracts over $50,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor and its Surety written Notice to Cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor and its Surety written notice declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a Notice of Termination without giving the Contractor another Notice to Cure.

(d) Demand on the Performance Bond: With the Notice of Termination the Owner shall give the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation to take charge of and complete the Work in accordance with the terms of the Performance Bond.

(e) Surety Claims: Upon receiving the Owner's demand on the Performance Bond, the Surety shall assume all rights and obligations of the Contractor under the Contract. However, the Surety shall also have the right to assert "Surety Claims" to the Owner, which are defined as claims relating to acts or omissions of the Owner or Architect prior to termination of the Contractor which may have prejudiced its rights as Surety or its interest in the unpaid balance of the Contract Sum. If the Surety wishes to assert a Surety Claim, it shall give the Owner, through the Architect, written notice within twenty-one days after first recognizing the condition giving rise to the Surety Claim. The Surety Claim shall then be submitted to the Owner, through the Architect, no later than sixty days after giving notice thereof, but no such Surety Claims shall be considered if submitted after the date upon which final payment

becomes due. Final resolution of Surety Claims shall be pursuant to Article 24, Resolution of Claims and Disputes. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

(f) Payments to Surety: The Surety shall be paid for completing the Work in accordance with the Contract Documents as if the Surety were the Contractor. The Owner shall have the right to deduct from payments to the Surety any reasonable costs incurred by the Owner, including compensation for additional architectural, engineering, managerial, and administrative services, and attorneys' fees as necessitated by termination of the Contractor and completion of the Work by the Surety. No further payments shall be made to the Contractor by the Owner. The Surety shall be solely responsible for any accounting to the Contractor for the portion of the Contract Sum paid to Surety by Owner or for the costs and expenses of completing the Work.

(4) Wrongful Termination: If any notice of termination by the Owner for cause, made in good faith, is determined to have been wrongly given, such termination shall be effective and compensation therefore determined as if it had been a termination for convenience pursuant to Paragraph B below.

B. TERMINATION by the OWNER for CONVENIENCE

(1) The Owner may, without cause and at any time, terminate the performance of Work under the Contract in whole, or in part, upon determination by the Owner that such termination is in the Owner's best interest. Such termination is referred to herein as Termination for Convenience.

(2) Upon receipt of a written notice of Termination for Convenience from the Owner, the Contractor shall:

(a) stop Work as specified in the notice;

(b) enter into no further subcontracts or purchase orders for materials, services, or facilities, except as may be necessary for Work directed to be performed prior to the effective date of the termination or to complete Work that is not terminated;

(c) terminate all existing subcontracts and purchase orders to the extent they relate to the terminated Work;

(d) take such actions as are necessary, or directed by the Architect or Owner, to protect, preserve, and make safe the terminated Work; and

(e) complete performance of the Work that is not terminated.

(3) In the event of Termination for Convenience, the Contractor shall be entitled to receive payment for the Work performed prior to its termination, including materials and equipment purchased and delivered for incorporation into the terminated Work, and any reasonable costs incurred because of the termination. Such payment shall include reasonable mark-up of costs for overhead and profit, not to exceed the limits stated in Article 19, Changes in the Work. The Contractor shall be entitled to receive payment for reasonable anticipated overhead ("home office") and shall not be entitled to receive payment for any profits anticipated to have been gained from the terminated Work. A proposal for decreasing the Contract Sum shall be submitted to the Architect by the Contractor in such time and detail, and with such supporting documentation, as is reasonably directed by the Owner. Final modification of the Contract shall be by Contract Change Order pursuant to Article 19. Any Claim or Dispute involving the termination or any amount due a party as a result shall be resolved pursuant to Article 24.

ARTICLE 28
CONTRACTOR'S RIGHT to SUSPEND or TERMINATE the CONTRACT

A. SUSPENSION by the OWNER

If all of the Work is suspended or delayed for the Owner's convenience or under an order of any court, or other public authority, for a period of sixty days, through no act or fault of the Contractor or a Subcontractor, or anyone for whose acts they may be liable, then the Contractor may give the Owner a written Notice of Termination which allows the Owner fourteen days after receiving the Notice in which to give the Contractor appropriate written authorization to resume the Work. Absent the Contractor's receipt of such authorization to resume the Work, the Contract shall terminate upon expiration of this fourteen day period and the Contractor will be compensated by the Owner as if the termination had been for the Owner's convenience pursuant to Article 27.B.

B. NONPAYMENT

The Owner's failure to pay the undisputed amount of an Application for Payment within sixty days after receiving it from the Architect (Certified pursuant to Article 30) shall be just cause for the Contractor to give the Owner fourteen days' written notice that the Work will be suspended pending receipt of payment but that the Contract shall terminate if payment is not received within fourteen days (or a longer period stated by the Contractor) of the expiration of the fourteen day notice period.

(1) If the Work is then suspended for nonpayment, but resumed upon receipt of payment, the Contractor will be entitled to compensation as if the suspension had been by the Owner pursuant to Article 26, Paragraph B.

(2) If the Contract is then terminated for nonpayment, the Contractor will be entitled to compensation as if the termination had been by the Owner pursuant to Article 27, Paragraph B.

ARTICLE 29
PROGRESS PAYMENTS

A. FREQUENCY of PROGRESS PAYMENTS

Unless otherwise provided in the Contract Documents, the Owner will make payments to the Contractor as the Work progresses based on monthly estimates prepared and certified by the Contractor, approved and certified by the Architect, and approved by the Owner and other authorities whose approval is required.

B. SCHEDULE of VALUES

Within ten days after receiving the Notice to Proceed the Contractor shall submit to the Architect a Schedule of Values, which is a breakdown of the Contract Sum showing the value of the various

parts of the Work for billing purposes. The Schedule of Values shall be prepared on 81/2" × 11" paper in a format that is acceptable to the Architect and Owner and shall divide the Contract Sum into as many parts ("line items") as the Architect and Owner determine necessary to permit evaluation and to show amounts attributable to Subcontractors. The Contractor's overhead and profit are to be proportionately distributed throughout the line items of the Schedule of Values. Upon approval, the Schedule of Values shall be used as a basis for monthly Applications for Payment, unless it is later found to be in error. Approved change order amounts shall be added to or incorporated into the Schedule of Values as mutually agreed by the Contractor and Architect.

C. APPLICATIONS for PAYMENTS

(1) Based on the approved Schedule of Values, each monthly Application for Payment shall show the Contractor's estimate of the value of Work performed in each line item as of the end of the billing period. The Contractor's cost of materials and equipment not yet incorporated into the Work, but delivered and suitably stored on the site, may be considered in monthly Applications for Payment.

(2) The Contractor's estimate of the value of Work performed and stored materials must represent such reasonableness as to warrant certification by the Architect to the Owner in accordance with Article 30. Each monthly Application for Payment shall be supported by such data as will substantiate the Contractor's right to payment, including without limitation copies of requisitions from subcontractors and material suppliers.

(3) If no other date is stated in the Contract Documents or agreed upon by the parties, each monthly Application for Payment shall be submitted to the Architect on or about the first day of each month and payment shall be issued to the Contractor within thirty days after an Application for Payment is Certified pursuant to Article 30 and delivered to the Owner

D. MATERIALS STORED OFF SITE

Unless otherwise provided in the Contract Documents, the Contractor's cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

(1) the contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location;

(2) a Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party;

(3) the Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner;

(4) the materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner; and

(5) compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest.

E. RETAINAGE

(1) "Retainage" is defined as the money earned and, therefore, belonging to the Contractor (subject to final settlement of the Contract) which has been retained by the Owner conditioned on final completion and acceptance of all Work required by the Contract Documents. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(2) In making progress payments the Owner shall retain five percent of the estimated value of Work performed and the value of the materials stored for the Work; but after retainage has been held upon fifty percent of the Contract Sum, no additional retainage will be withheld.

F. CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's notarized certification that, to the best of the Contractor's knowledge, information, and belief, the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payments were issued and payments received from the Owner and that the current payment shown in the Application for Payment has not yet been received.

(2) By making this certification the Contractor represents to the Architect and Owner that, upon receipt of previous progress payments from the Owner, the Contractor has promptly paid each Subcontractor, in accordance with the terms of its agreement with the Subcontractor, the amount due the Subcontractor from the amount included in the progress payment on account of the Subcontractor's Work and stored materials. The Architect and Owner may advise Subcontractors and suppliers regarding percentages of completion or amounts requested and/or approved in an Application for Payment on account of the Subcontractor's Work and stored materials.

G. PAYMENT ESTABLISHES OWNERSHIP

All material and Work covered by progress payments shall become the sole property of the Owner, but the Contractor shall not be relieved from the sole responsibility for the care and protection of material and Work upon which payments have been made and for the restoration of any damaged material and Work.

ARTICLE 30
CERTIFICATION and APPROVALS for PAYMENT

A. The Architect's review, approval, and certification of Applications for Payment shall be based on the Architect's general knowledge of the Work obtained through site visits and the information provided by the Contractor with the Application. The Architect shall not be required to perform exhaustive examinations, evaluations, or estimates of the cost of completed or uncompleted Work or stored materials to verify the accuracy of amounts requested by the Contractor, but the Architect shall have the authority to adjust the Contractor's estimate when, in the Architect's reasonable opinion, such estimates are overstated or understated.

B. Within seven days after receiving the Contractor's monthly Application for Payment, or such other

time as may be stated in the Contract Documents, the Architect will take one of the following actions:

(1) The Architect will approve and certify the Application as submitted and forward it as a Certification for Payment for approval by the Owner (and other approving authorities, if any) and payment.

(2) If the Architect takes exception to any amounts claimed by the Contractor and the Contractor and Architect cannot agree on revised amounts, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to certify to the Owner, transmitting a copy of same to the Contractor.

(3) To the extent the Architect determines may be necessary to protect the Owner from loss on account of any of the causes stated in Article 31, the Architect may subtract from the Contractor's estimates and will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due and notify the Contractor and Owner in writing of the Architect's reasons for withholding payment in whole or in part.

C. Neither the Architect's issuance of a Certificate for Payment nor the Owner's resulting progress payment shall be a representation to the Contractor that the Work in progress or completed at that time is accepted or deemed to be in conformance with the Contract Documents.

D. The Architect shall not be required to determine that the Contractor has promptly or fully paid Subcontractors and suppliers or how or for what purpose the Contractor has used monies paid under the Construction Contract. However, the Architect may, upon request and if practical, inform any Subcontractor or supplier of the amount, or percentage of completion, approved or paid to the Contractor on account of the materials supplied or the Work performed by the Subcontractor.

ARTICLE 31
PAYMENTS WITHHELD

A. The Architect may nullify or revise a previously issued Certificate for Payment prior to Owner's payment thereunder to the extent as may be necessary in the Architect's opinion to protect the Owner from loss on account of any of the following causes not discovered or fully accounted for at the time of the certification or approval of the Application for Payment:

(1) Defective Work;
(2) filed, or reasonable evidence indicating probable filing of, claims arising out of the Contract by other parties against the Contractor;
(3) the Contractor's failure to pay for labor, materials or equipment or to pay Subcontractors;
(4) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
(5) damage suffered by the Owner or another contractor caused by the Contractor, a Subcontractor, or anyone for whose acts they may be liable;
(6) reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance is insufficient to cover applicable liquidated damages; or
(7) the Contractor's persistent failure to conform to the requirements of the Contract Documents.

B. If the Owner deems it necessary to withhold payment pursuant to preceding Paragraph A, the

Owner will notify the Contractor and Architect in writing of the amount to be withheld and the reason for same.

C. The Architect shall not be required to withhold payment for completed or partially completed Work for which compliance with the Contract Documents remains to be determined by Specified Inspections or Final Inspections to be performed in their proper sequence. However, if Work for which payment has been approved, certified, or made under an Application for Payment is subsequently determined to be Defective Work, the Architect shall determine an appropriate amount that will protect the Owner's interest against the Defective Work.

(1) If payment has not been made against the Application for Payment first including the Defective Work, the Architect will notify the Owner and Contractor of the amount to be withheld from the payment until the Defective Work is brought into compliance with the Contract Documents.

(2) If payment has been made against the Application for Payment first including the Defective Work, the Architect will withhold the appropriate amount from the next Application for Payment submitted after the determination of noncompliance, such amount to then be withheld until the Defective Work is brought into compliance with the Contract Documents.

D. The amount withheld will be paid with the next Application for Payment certified and approved after the condition for which the Owner has withheld payment is removed or otherwise resolved to the Owner's satisfaction.

E. The Owner shall have the right to withhold from payments due the Contractor under this Contract an amount equal to any amount which the Contractor owes the Owner under another contract.

ARTICLE 32
SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work ("punch list" items). Substantial Completion of the Work, or a designated portion of the Work, is not achieved until so agreed in a Certificate of Substantial Completion signed by the Contractor, Architect, Owner, and Technical Staff of the Alabama Building Commission.

B. The Contractor shall notify the Architect in writing when it considers the Work, or a portion of the Work which the Owner has agreed to accept separately, to be substantially complete and ready for a Final Inspection pursuant to Article 16. In this notification the Contractor shall identify any items remaining to be completed or corrected for Final Acceptance prior to final payment.

C. Substantial Completion is achieved and a Final Inspection is appropriate only when a minimal number of punch list items exists and only a short period of time will be required to correct or complete them. Upon receipt of the Contractor's notice for a Final Inspection, the Architect will advise the Contractor in writing of any conditions of the Work which the Architect or Owner is aware do not constitute Substantial Completion, otherwise, a Final Inspection will proceed within a

reasonable time after the Contractor's notice is given. However, the Architect will not be required to prepare lengthy listings of punch list items; therefore, if the Final Inspection discloses that Substantial Completion has not been achieved, the Architect may discontinue or suspend the inspection until the Contractor does achieve Substantial Completion.

D. CERTIFICATE of SUBSTANTIAL COMPLETION

(1) When the Work or a designated portion of the Work is substantially complete, the Architect will prepare and sign a Certificate of Substantial Completion to be signed in order by the Contractor, Owner, and Alabama Building Ccommission.

(2) When signed by all parties, the Certificate of Substantial Completion shall establish the Date of Substantial Completion which is the date upon which:

(a) the Work, or designated portion of the Work, is accepted by the Architect, Owner, and Alabama Building Commission as being ready for occupancy,

(b) the Contractor's one-year and special warranties for the Work covered by the Certificate commence, unless stated otherwise in the Certificate (the one-year warranty for punch list items completed or corrected after the period allowed in the Certificate shall commence on the date of their Final Acceptance) , and

(c) Owner becomes responsible for building security, maintenance, utility services, and insurance, unless stated otherwise in the Certificate.

(3) The Certificate of Substantial Completion shall set the time within which the Contractor shall finish all items on the "punch list" accompanying the Certificate. The completion of punch list items shall be a condition precedent to Final Payment.

(4) If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor's (5-year) Roofing Guarantee, ABC Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion. The Alabama Building Commission will not sign the Certificate of Substantial Completion in the absence of the roofing guarantees.

E. The Date of Substantial Completion of the Work, as set in the Certificate of Substantial Completion of the Work or of the last completed portion of the Work, establishes the extent to which the Contractor is liable for Liquidated Damages, if any; however, should the Contractor fail to complete all punch list items within thirty days, or such other time as may be stated in the respective Certificate of Substantial Completion, the Contractor shall bear any expenses, including additional Architectural services and expenses, incurred by the Owner as a result of such failure to complete punch list items in a timely manner.

ARTICLE 33
OCCUPANCY or USE PRIOR to COMPLETION

A. UPON SUBSTANTIAL COMPLETION

Prior to completion of the entire Work, the Owner may occupy or begin utilizing any designated

portion of the Work on the agreed Date of Substantial Completion of that portion of the Work.

B. BEFORE SUBSTANTIAL COMPLETION

(1) The Owner shall not occupy or utilize any portion of the Work before Substantial Completion of that portion has been achieved.

(2) The Owner may deliver furniture and equipment and store, or install it in place ready for occupancy and use, in any designated portion of the Work before it is substantially completed under the following conditions:

(a) The Owner's storage or installation of furniture and equipment will not unreasonably disrupt or interfere with the Contractor's completion of the designated portion of the Work.

(b) The Contractor consents to the Owner's planned action (such consent shall not be unreasonably withheld).

(c) The Owner shall be responsible for insurance coverage of the Owner's furniture and equipment, and the Contractor's liability shall not be increased.

(d) The Contractor, Architect, and Owner will jointly inspect and record the condition of the Work in the area before the Owner delivers and stores or installs furniture and equipment; the Owner will equitably compensate the Contractor for making any repairs to the Work that may subsequently be required due to the Owner's delivery and storage or installation of furniture and equipment.

(e) The Owner's delivery and storage or installation of furniture and equipment shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the Contract Documents.

ARTICLE 34
FINAL PAYMENT

A. PREREQUISITES to FINAL PAYMENT

The following conditions are prerequisites to Final Payment becoming due the Contractor:

(1) Full execution of a Certificate of Substantial Completion for the Work, or each designated portion of the Work.

(2) Final Acceptance of the Work.

(3) The Contractor's completion, to the satisfaction of the Architect and Owner, of all documentary requirements of the Contract Documents; such as delivery of "as-built" documents, operating and maintenance manuals, warranties, etc.

(4) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect.

(5) Completion of an Advertisement for Completion pursuant to Paragraph C below.

(6) Delivery by the Contractor to the Owner through the Architect of a Release of Claims and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below.

(7) Consent of Surety, if any, to Final Payment to Contractor.

(8) Delivery by the Contractor to the Architect and Owner of other documents, if any, required by the Contract Documents as prerequisites to Final Payment.

B. FINAL ACCEPTANCE of the WORK

"Final Acceptance of the Work" shall be achieved when all "punch list" items recorded with the Certificate(s) of Substantial Completion are accounted for by either: **(1)** their completion or correction by the Contractor and acceptance by the Architect, Owner, and BC Project Inspector, or **(2)** their resolution under Article 18, Deductions for Uncorrected Work.

C. ADVERTISEMENT for COMPLETION

(1) If the Contract Sum is less than $50,000: The Owner, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion published one time in a newspaper of general circulation, published in the county in which the Owner is located and shall post notice of completion of the Contract on the Owner's bulletin board for one week, and shall require the Contractor to certify under oath that all bills have been paid in full. Final payment may be made at any time after the notice has been posted for one entire week.

(2) If the Contract Sum is more than $50,000: The Contractor, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion, similar to the sample contained in the Project Manual, published for a period of four successive weeks in some newspaper of general circulation published within the city or county where the Work was performed. Proof of publication of the Advertisement for Completion, in duplicate, shall be made by the Contractor to the Architect by affidavit of the publisher and a printed copy of the Advertisement for Completion published, in duplicate. If no newspaper is published in the county where the work was done, the notice may be given by posting at the Court House for thirty days and proof of same made by Probate Judge or Sheriff and the Contractor. Final payment shall not be due until thirty days after this public notice is completed.

D. RELEASE of CLAIMS

The Release of Claims and other documents referenced in Paragraph A(6) above are as follows:

(1) A release executed by Contractor of all claims and claims of lien against the Owner arising under and by virtue of the Contract, other than such claims of the Contractor, if any, as may have been previously made in writing and as may be specifically excepted by the Contractor from the operation of the release in stated amounts to be set forth therein.

(2) An affidavit under oath, if required, stating that so far as the Contractor has knowledge or information, there are no claims or claims of lien which have been or will be filed by any Subcontractor, Supplier or other party for labor or material for which a claim or claim of lien could be filed.

(3) A release, if required, of all claims and claims of lien made by any Subcontractor, Supplier or other party against the Owner or unpaid Contract funds held by the Owner arising under or related to the Work on the Project; provided, however, that if any Subcontractor, Supplier or others refuse to furnish a release of such claims or claims of lien, the Contractor may furnish a bond executed by Contractor and its Surety to the Owner to provide an unconditional obligation to defend, indemnify

and hold harmless the Owner against any loss, cost or expense, including attorney's fees, arising out of or as a result of such claims, or claims of lien, in which event Owner may make Final Payment notwithstanding such claims or claims of lien. If Contractor and Surety fail to fulfill their obligations to Owner under the bond, the Owner shall be entitled to recover damages as a result of such failure, including all costs and reasonable attorney's fees incurred to recover such damages.

E. EFFECT of FINAL PAYMENT

(1) The making of Final Payment shall constitute a waiver of Claims by the Owner except those arising from:

- **(a)** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **(b)** failure of the Work to comply with the requirements of the Contract Documents;
- **(c)** terms of warranties or indemnities required by the Contract Documents, or
- **(d)** latent defects.

(2) Acceptance of Final Payment by the Contractor shall constitute a waiver of claims by Contractor except those previously made in writing, identified by Contractor as unsettled at the time of final Application for Payment, and specifically excepted from the release provided for in Paragraph D(1), above.

ARTICLE 35
CONTRACTOR'S WARRANTY

A. GENERAL WARRANTY

The Contractor warrants to the Owner and Architect that all materials and equipment furnished under the Contract will be of good quality and new, except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise, and that none of the Work will be Defective Work as defined in Article 1.

B. ONE-YEAR WARRANTY

(1) If, within one year after the date of Substantial Completion of the Work or each designated portion of the Work (or otherwise as agreed upon in a mutually-executed Certificate of Substantial Completion), any of the Work is found to be Defective Work, the Contractor shall promptly upon receipt of written notice from the Owner or Architect, and without expense to either, replace or correct the Defective Work to conform to the requirements of the Contract Documents, and repair all damage to the site, the building and its contents which is the result of Defective Work or its replacement or correction.

(2) The one-year warranty for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The one-year warranty for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion, and other Work performed after Substantial Completion, shall begin on the date of Final

Acceptance of the Work. The Contractor's correction of Work pursuant to this warranty does not extend the period of the warranty. The Contractor's one-year warranty does not apply to defects or damages due to improper or insufficient maintenance, improper operation, or wear and tear during normal usage.

(3) Upon recognizing a condition of Defective Work, the Owner shall promptly notify the Contractor of the condition. If the condition is causing damage to the building, its contents, equipment, or site, the Owner shall take reasonable actions to mitigate the damage or its continuation, if practical. If the Contractor fails to proceed promptly to comply with the terms of the warranty, or to provide the Owner with satisfactory written verification that positive action is in process, the Owner may have the Defective Work replaced or corrected and the Contractor and the Contractor's Surety shall be liable for all expense incurred.

(4) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one-year warranty period(s). The subsequent delivery of the Architect's report of a Year-end Inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(5) The Contractor's warranty of one year is in addition to, and not a limitation of, any other remedy stated herein or available to the Owner under applicable law.

C. GENERAL CONTRACTOR'S ROOFING GUARANTEE

(1) In addition to any other roof related warranties or guarantees that may be specified in the Contract Documents, the roof and associated work shall be guaranteed by the General Contractor against leaks and defects of materials and workmanship for a period of five (5) years, starting on the Date of Substantial Completion of the Project as stated in the Certificate of Substantial Completion. This guarantee for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The guarantee for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion shall begin on the date of Final Acceptance of the Work.

(2) The "General Contractor's Roofing Guarantee" (ABC Form C-9), included in the Project Manual, shall be executed in triplicate, signed by the appropriate party and submitted to the Architect for submission with the Certificate of Substantial Completion to the Owner and the Building Commission.

(3) This guarantee does not include costs which might be incurred by the General Contractor in making visits to the site requested by the Owner regarding roof problems that are due to lack of proper maintenance (keeping roof drains and/or gutters clear of debris that cause a stoppage of drainage which results in water ponding, overflowing of flashing, etc.), or damages caused by vandalism or misuse of roof areas. Should the contractor be required to return to the job to correct problems of this nature that are determined not to be related to faulty workmanship and materials in the installation of the roof, payment for actions taken by the Contractor in response to such request will be the responsibility of the Owner. A detailed written report shall be made by the General Contractor on each of these 'Service Calls' with copies to the Architect, Owner and Building

Commission.

D. SPECIAL WARRANTIES

(1) The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

(2) The Contractor and the Contractor's Surety shall be liable to the Owner for such special warranties during the Contractor's one-year warranty; thereafter, the Contractor's obligations relative to such special warranties shall be to provide reasonable assistance to the Owner in their enforcement.

E. ASSUMPTION of GUARANTEES of OTHERS

If the Contractor disturbs, alters, or damages any work guaranteed under a separate contract, thereby voiding the guarantee of that work, the Contractor shall restore the work to a condition satisfactory to the Owner and shall also guarantee it to the same extent that it was guaranteed under the separate contract.

ARTICLE 36
INDEMNIFICATION AGREEMENT

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, Architect, Architect's consultants, Alabama Building Commission, State Department of Education (if applicable), and their agents, employees, and consultants (hereinafter collectively referred to as the "Indemnitees") from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of, related to, or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, and is caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether such claim, damage, loss or expense is caused in part, or is alleged but not legally established to have been caused in whole or in part by the negligence or other fault of a party indemnified hereunder.

A. This indemnification shall extend to all claims, damages, losses and expenses for injury or damage to adjacent or neighboring property, or persons injured thereon, that arise out of, relate to, or result from performance of the Work.

B. This indemnification does not extend to the liability of the Architect, or the Architect's Consultants, agents, or employees, arising out of **(1)** the preparation or approval of maps, shop drawings, opinions, reports, surveys, field orders, Change Orders, drawings or specifications, or **(2)** the giving of or the failure to give directions or instructions, provided such giving or failure to give instructions is the primary cause of the injury or damage.

C. This indemnification does not apply to the extent of the sole negligence of the Indemnitees.

ARTICLE 37
CONTRACTOR'S and SUBCONTRACTORS' INSURANCE

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified self-insureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract. The insurance certificate must provide the following:

- **(a)** Name and address of authorized agent of the insurance company
- **(b)** Name and address of insured
- **(c)** Name of insurance company or companies
- **(d)** Description of policies
- **(e)** Policy Number(s)
- **(f)** Policy Period(s)
- **(g)** Limits of liability
- **(h)** Name and address of Owner as certificate holder
- **(i)** Project Name and Number, if any
- **(j)** Signature of authorized agent of the insurance company
- **(k)** Telephone number of authorized agent of the insurance company

(l) Mandatory thirty day notice of cancellation / non-renewal / change

(5) MAXIMUM DEDUCTIBLE. Self-insured retention, except for qualified self-insurers or group self-insurers, in any policy shall not exceed $25,000.00.

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A self-insurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

.1 Bodily Injury by Accident - $1,000,000 each accident

.2 Bodily Injury by Disease - $1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
.1 General Aggregate	$ 2,000,000.00 per Project
.2 Products, Completed Operations Aggregate	$ 2,000,000.00 per Project
.3 Personal and Advertising Injury	$ 1,000,000.00 per Occurrence
.4 Each Occurrence	$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

.2 The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than $1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants, and employees as

additional insureds.

(4) COMMERCIAL UMBRELLA LIABILITY INSURANCE

(a) Commercial Umbrella Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial/Excess Umbrella Limits of:

.1 $ 5,000,000 per Occurrence

.2 $ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

.2 The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

C. SUBCONTRACTORS' INSURANCE

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain adequate General Liability, Automobile Liability, and Umbrella Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion. However, in the case that the Work involves separate buildings, Builder's Risk coverage of each separate building may terminate on the Date of Substantial Completion as established in the Certificate of Substantial Completion issued for each building.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by builder's risk insurance or other property insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall survive final acceptance and continue to apply to insured losses to the Work or other property on or adjacent to the Project.

PERFORMANCE and PAYMENT BONDS

A. GENERAL

Upon signing and returning the Construction Contract to the Owner for final approval and execution, the Contractor shall, at the Contractor's expense, furnish to the Owner a Performance Bond and a Payment Bond, each in a penal sum equal to 100% of the Contract Sum. Each bond shall be on the form contained in the Project Manual, shall be executed by a surety company (Surety) acceptable to the Owner and duly authorized and qualified to make such bonds in the State of Alabama in the required amounts, shall be countersigned by an authorized, Alabama resident agent of the Surety who is qualified to execute such instruments, and shall have attached thereto a power of attorney of the signing official.

The provisions of this Article are not applicable to this Contract if the Contract Sum is less than $50,000, unless bonds are required for this Contract in the Supplemental General Conditions.

B. PERFORMANCE BOND

Through the Performance Bond, the Surety's obligation to the Owner shall be to assure the prompt and faithful performance of the Contract and Contract Change Orders. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. In case of default on the part of the Contractor, the Surety shall take charge of and complete the Work in accordance with the terms of the Performance Bond. Any reasonable expenses incurred by the Owner as a result of default on the part of the Contractor, including architectural, engineering, administrative, and legal services, shall be recoverable under the Performance Bond.

C. PAYMENT BOND

Through the Payment Bond the Surety's obligation to the Owner shall be to guarantee that the Contractor and its Subcontractors shall promptly make payment to all persons supplying labor, materials, or supplies for, or in, the prosecution of the Work, including the payment of reasonable attorneys fees incurred by successful claimants or plaintiffs in civil actions on the Bond. Any person or entity indicating that they have a claim of nonpayment under the Bond shall, upon written request, be promptly furnished a certified copy of the Bond and Construction Contract by the Contractor, Architect, Owner, or Alabama Building Commission, whomever is recipient of the request.

D. CHANGE ORDERS

The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

E. EXPIRATION

The obligations of the Contractor's performance bond surety shall be coextensive with the contractor's performance obligations under the Contract Documents; provided, however, that the surety's obligation shall expire at the end of the one-year warranty period(s) of Article 35.

ARTICLE 39
ASSIGNMENT

The Contractor shall not assign the Contract or sublet it as a whole nor assign any moneys due or to become due to the Contractor thereunder without the previous written consent of the Owner (and of the Surety, in the case of a bonded Construction Contract). As prescribed by the Public Works Law, the Contract shall in no event be assigned to an unsuccessful bidder for the Contract whose bid was rejected because the bidder was not a responsible or responsive bidder.

ARTICLE 40
CONSTRUCTION by OWNER or SEPARATE CONTRACTORS

A. OWNER'S RESERVATION of RIGHT

(1) The Owner reserves the right to self-perform, or to award separate contracts for, other portions of the Project and other Project related construction and operations on the site. The contractual conditions of such separate contracts shall be substantially similar to those of this Contract, including insurance requirements and the provisions of this Article. If the Contractor considers such actions to involve delay or additional cost under this Contract, notifications and assertion of claims shall be as provided in Article 20 and Article 23.

(2) When separate contracts are awarded, the term "Contractor" in the separate Contract Documents shall mean the Contractor who executes the respective Construction Contract.

B. COORDINATION

Unless otherwise provided in the Contract Documents, the Owner shall be responsible for coordinating the activities of the Owner's forces and separate contractors with the Work of the Contractor. The Contractor shall cooperate with the Owner and separate contractors, shall participate in reviewing and comparing their construction schedules relative to that of the Contractor when directed to do so, and shall make and adhere to any revisions to the construction schedule resulting from a joint review and mutual agreement.

C. CONDITIONS APPLICABLE to WORK PERFORMED by OWNER

Unless otherwise provided in the Contract Documents, when the Owner self-performs construction or operations related to the Project, the Owner shall be subject to the same obligations to Contractor as Contractor would have to a separate contractor under the provision of this Article 40.

D. MUTUAL RESPONSIBILITY

(1) The Contractor shall reasonably accommodate the required introduction and storage of materials and equipment and performance of activities by the Owner and separate contractors and shall connect and coordinate the Contractor's Work with theirs as required by the Contract Documents.

(2) By proceeding with an element or portion of the Work that is applied to or performed on construction by the Owner or a separate contractor, or which relies upon their operations, the Contractor accepts the condition of such construction or operations as being suitable for the Contractor's Work, except for conditions that are not reasonably discoverable by the Contractor. If the Contractor discovers any condition in such construction or operations that is not suitable for the proper performance of the Work, the Contractor shall not proceed, but shall instead promptly notify the Architect in writing of the condition discovered.

(3) The Contractor shall reimburse the Owner for any costs incurred by a separate contractor and payable by the Owner because of acts or omissions of the Contractor. Likewise, the Owner shall be responsible to the Contractor for any costs incurred by the Contractor because of the acts or omissions of a separate contractor.

(4) The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without the written consent of the Owner and separate contractor; such consent shall not be unreasonably withheld. Likewise, the Contractor shall not unreasonably withhold its consent allowing the Owner or a separate contractor to cut or otherwise alter the Work.
(5) The Contractor shall promptly remedy any damage caused by the Contractor to the construction or property of the Owner or separate contractors.

ARTICLE 41
SUBCONTRACTS

A. AWARD of SUBCONTRACTS and OTHER CONTRACTS for PORTIONS of the WORK

(1) Unless otherwise provided in the Contract Documents, when delivering the executed Construction Contract, bonds, and evidence of insurance to the Architect, the Contractor shall also submit a listing of Subcontractors proposed for each principal portion of the Work and fabricators or suppliers proposed for furnishing materials or equipment fabricated to the design of the Contract Documents. This listing shall be in addition to any naming of Subcontractors, fabricators, or suppliers that may have been required in the bid process. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any Subcontractor, fabricator, or supplier proposed by the Contractor. The issuance of the Notice to Proceed in the absence of such objection by the Owner shall constitute notice that no reasonable objection to them is made.

(2) The Contractor shall not contract with a proposed Subcontractor, fabricator, or supplier to whom the Owner has made reasonable and timely objection. Except in accordance with prequalification procedures as may be contained in the Contract Documents, through specified qualifications, or on the grounds of reasonable objection, the Owner may not restrict the Contractor's selection of Subcontractors, fabricators, or suppliers.

(3) Upon the Owner's reasonable objection to a proposed Subcontractor, fabricator, or supplier, the Contractor shall promptly propose another to whom the Owner has no reasonable objection. If the proposed Subcontractor, fabricator, or supplier to whom the Owner made reasonable objection was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be equitably adjusted by Contract Change Order for any resulting difference if the Contractor has acted promptly and responsively in this procedure.

(4) The Contractor shall not change previously selected Subcontractors, fabricators, or suppliers without notifying the Architect and Owner in writing of proposed substitute Subcontractors, fabricators, or suppliers. If the Owner does not make a reasonable objection to a proposed substitute within three working days, the substitute shall be deemed approved.

B. SUBCONTRACTUAL RELATIONS

(1) The Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its subcontractors and material suppliers) to all the provisions of the Contract Documents as they apply to the Subcontractor's and material supplier's portion of the Work.

(2) Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner, nor to create a duty of the Architect, Owner, or Director to resolve disputes between or among the Contractor or its Subcontractors and suppliers or any other duty to such Subcontractors or suppliers.

ARTICLE 42
ARCHITECT'S STATUS

A. The Architect is an independent contractor performing, with respect to this Contract, pursuant to an agreement executed between the Owner and the Architect. The Architect has prepared the Drawings and Specifications and assembled the Contract Document and is, therefore, charged with their interpretation and clarification as described in the Contract Documents. As a representative of the Owner, the Architect will endeavor to guard the Owner against variances from the requirements of the Contract Documents by the Contractor. On behalf of the Owner, the Architect will administer the Contract as described in the Contract Documents during construction and the Contractor's one-year warranty.

B. So as to maintain continuity in administration of the Contract and performance of the Work, and to facilitate complete documentation of the project record, all communications between the Contractor and Owner regarding matters of or related to the Contract shall be directed through the Architect, unless direct communication is otherwise required to provide a legal notification. Unless otherwise authorized by the Architect, communications by and with the Architect's consultants shall be through the Architect. Unless otherwise authorized by the Contractor, communications by and with Subcontractors and material suppliers shall be through the Contractor.

C. ARCHITECT'S AUTHORITY

Subject to other provisions of the Contract Documents, the following summarizes some of the authority vested in the Architect by the Owner with respect to the Construction Contract and as further described or conditioned in other Articles of these General Conditions of the Contract.

(1) The Architect is authorized to:

(a) approve "minor" deviations as defined in Article 9, Submittals,
(b) make "minor" changes in the Work as defined in Article 19, Changes in the Work,
(c) reject or require the correction of Defective Work,
(d) require the Contractor to stop the performance of Defective Work,
(e) adjust an Application for Payment by the Contractor pursuant to Article 30, Certification and Approval of payments, and

(f) issue Notices to Cure pursuant to Article 27.

(2) The Architect is not authorized to:

(a) revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and changes) without concurrence of the Owner,

(b) finally approve or accept any portion of the Work without concurrence of the Owner,

(c) issue instructions contrary to the Contract Documents,

(d) issue Notice of Termination or otherwise terminate the Contract, or

(e) require the Contractor to stop the Work except only to avoid the performance of Defective Work.

D. LIMITATIONS of RESPONSIBILITIES

(1) The Architect shall not be responsible to Contractors or to others for supervising or coordinating the performance of the Work or for the Construction Methods or safety of the Work, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Architect will not be responsible to the Contractor (nor the Owner) for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents or for acts or omissions of the Contractor, a Subcontractor, or anyone for whose acts they may be liable. However, the Architect will report to the Owner and Contractor any Defective Work recognized by the Architect.

(3) The Architect will endeavor to secure faithful performance by Owner and Contractor, and the Architect will not show partiality to either or be liable to either for results of interpretations or decisions rendered in good faith.

(4) The Contractor's remedies for additional time or expense arising out of or related to this Contract, or the breach thereof, shall be solely as provided for in the Contract Documents. The Contractor shall have no claim or cause of action against the Owner, Architect, or its consultants for any actions or failures to act, whether such claim may be in contract, tort, strict liability, or otherwise, it being the agreement of the parties that the Contractor shall make no claim against the Owner or any agents of the Owner, including the Architect or its consultants, except as may be provided for claims or disputes submitted in accordance with Article 24. The Architect and Architect's consultants shall be considered third party beneficiaries of this provision of the Contract and entitled to enforce same.

E. ARCHITECT'S DECISIONS

Decisions by the Architect shall be in writing The Architect's decisions on matters relating to aesthetic effect will be final and binding if consistent with the intent expressed in the Contract Documents. The Architect's decisions regarding disputes arising between the Contractor and Owner shall be advisory.

ARTICLE 43
CASH ALLOWANCES

A. All allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by allowances shall be supplied by the Contractor as directed by the Architect or Owner

and the Contractor shall afford the Owner the economy of obtaining competitive pricing from responsible bidders for allowance items unless other purchasing procedures are specified in the Contract Documents.

B. Unless otherwise provided in the Contract Documents:

(1) allowances shall cover the cost to the Contractor of materials and equipment delivered to the Project site and all applicable taxes, less applicable trade discounts;

(2) the Contractor's costs for unloading, storing, protecting, and handling at the site, labor, installation, overhead, profit and other expenses related to materials or equipment covered by an allowance shall be included in the Contract Sum but not in the allowances;

(3) if required, the Contract Sum shall be adjusted by Change Order to reflect the actual costs of an allowance.

C. Any selections of materials or equipment required of the Architect or Owner under an allowance shall be made in sufficient time to avoid delay of the Work.

ARTICLE 44
PERMITS, LAWS, and REGULATIONS

A. PERMITS, FEES AND NOTICES

(1) Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids.

(2) The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

B. TAXES

Unless stated otherwise in the Contract Documents, materials incorporated into the Work are exempt from sales and use tax pursuant to Section 40-9-33, Code of Alabama, 1975 as amended. The Contractor and its subcontractors shall be responsible for complying with rules and regulations of the Sales, Use, & Business Tax Division of the Alabama Department of Revenue regarding certificates and other qualifications necessary to claim such exemption when making qualifying purchases from vendors. The Contractor shall pay all applicable taxes that are not covered by the exemption of Section 40-9-33 and which are imposed as of the date of receipt of bids, including those imposed as of the date of receipt of bids but scheduled to go into effect after that date.

C. COMPENSATION for INCREASES

The Contractor shall be compensated for additional costs incurred because of increases in tax rates imposed after the date of receipt of bids.

ARTICLE 45
ROYALTIES, PATENTS, and COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, Alabama Building Commission, State Department of Education (if applicable), and their agents, employees, and consultants from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of, related to, or resulting from all suits or claims for infringement of any patent rights or copyrights arising out of the inclusion of any patented or copyrighted materials, methods, or systems selected by the Contractor and used during the execution of or incorporated into the Work. This indemnification does not apply to any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods, or systems specified in the Contract Documents. However, if the Contractor has information that a specified material, method, or system is or may constitute an infringement of a patent or copyright, the Contractor shall be responsible for any resulting loss unless such information is promptly furnished to the Architect.

ARTICLE 46
USE of the SITE

A. The Contractor shall confine its operations at the Project site to areas permitted by the Owner and by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials, equipment, employees' vehicles, or debris. The Contractor's operations at the site shall be restricted to the sole purpose of constructing the Work, use of the site as a staging, assembly, or storage area for other business which the Contractor may undertake shall not be permitted.

B. Unless otherwise provided in the Contract Documents, temporary facilities, such as storage sheds, shops, and offices may be erected on the Project site with the approval of the Architect and Owner. Such temporary buildings and/or utilities shall remain the property of the Contractor, and be removed at the Contractor's expense upon completion of the Work, unless the Owner authorizes their abandonment without removal.

ARTICLE 47
CUTTING and PATCHING

A. The Contractor shall be responsible for all cutting, fitting, or patching that may be required to execute the Work to the results indicated in the Contract Documents or to make its parts fit together properly.

B. Any cutting, patching, or excavation by the Contractor shall be supervised and performed in a manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of the Owner or separate contractors.

ARTICLE 48
IN-PROGRESS and FINAL CLEANUP

A. IN-PROGRESS CLEAN-UP

(1) The Contractor shall at all times during the progress of the Work keep the premises and

surrounding area free from rubbish, scrap materials and debris resulting from the Work. Trash and combustible materials shall not be allowed to accumulate inside buildings or elsewhere on the premises. At no time shall any rubbish be thrown from window openings. Burning of trash and debris on site is not permitted.

(2) The Contractor shall make provisions to minimize and confine dust and debris resulting from construction activities.

B. FINAL CLEAN-UP

(1) Before Substantial Completion or Final Acceptance is achieved, the Contractor shall have removed from the Owner's property all construction equipment, tools, and machinery; temporary structures and/or utilities including the foundations thereof (except such as the Owner permits in writing to remain); rubbish, debris, and waste materials; and all surplus materials, leaving the site clean and true to line and grade, and the Work in a safe and clean condition, ready for use and operation.

(2) In addition to the above, and unless otherwise provided in the Contract Documents, the Contractor shall be responsible for the following special cleaning for all trades as the Work is completed:

(a) Cleaning of all painted, enameled, stained, or baked enamel work: Removal of all marks, stains, finger prints and splatters from such surfaces.

(b) Cleaning of all glass: Cleaning and removing of all stickers, labels, stains, and paint from all glass, and the washing and polishing of same on interior and exterior.

(c) Cleaning or polishing of all hardware: Cleaning and polishing of all hardware.

(d) Cleaning all tile, floor finish of all kinds: Removal of all splatters, stains, paint, dirt, and dust, the washing and polishing of all floors as recommended by the manufacturer or required by the Architect.

(e) Cleaning of all manufactured articles, materials, fixtures, appliances, and equipment: Removal of all stickers, rust stains, labels, and temporary covers, and cleaning and conditioning of all manufactured articles, material, fixtures, appliances, and electrical, heating, and air conditioning equipment as recommended or directed by the manufacturers, unless otherwise required by the Architect; blowing out or flushing out of all foreign matter from all equipment, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers, sanitizing potable water systems; and freeing identification plates on all equipment of excess paint and the polishing thereof.

C. OWNER'S RIGHT to CLEAN-UP

If the Contractor fails to comply with these clean-up requirements and then fails to comply with a written directive by the Architect to clean-up the premises within a specified time, the Architect or Owner may implement appropriate clean-up measures and the cost thereof shall be deducted from any amounts due or to become due the Contractor.

ARTICLE 49
LIQUIDATED DAMAGES

A. Time is the essence of the Contract. Any delay in the completion of the Work required by the

Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.

B. The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.

C. If a daily liquidated damage amount is not otherwise provided for in the Contract Documents, a time charge equal to six percent interest per annum on the total Contract Sum may be made against the Contractor for the entire period after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work.

D. The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

ARTICLE 50
USE of FOREIGN MATERIALS

A. In the performance of the Work the Contractor agrees to use materials, supplies, and products manufactured, mined, processed or otherwise produced in the United States or its territories, if same are available at reasonable and competitive prices and are not contrary to any sole source specification implemented under the Public Works Law.

B. In the performance of the Work the Contractor agrees to use steel produced in the United States if the Contract Documents require the use of steel and do not limit its supply to a sole source pursuant to the Public Works Law. If the Owner decides that the procurement of domestic steel products becomes impractical as a result of national emergency, national strike, or other cause, the Owner shall waive this restriction.

C. If domestic steel or other domestic materials, supplies, and products are not used in accordance with preceding Paragraphs A and B, the Contract Sum shall be reduced by an amount equal to any savings or benefits realized by the Contractor.

D. This Article applies only to Public Works projects financed entirely by the State of Alabama or any political subdivision of the state.

ARTICLE 51

PROJECT SIGN

(Not required for locally-funded SDE projects.)

If the Contract Sum (as awarded) is $100,000.00 or more, the Contractor shall furnish and erect a project sign as shown in "Detail of Project Sign" (ABC Form C-15) bound in the Project Manual. The project sign shall be erected in a prominent location selected by the Architect and Owner and shall be maintained in good condition until completion of Work. If the Contract involves Work on multiple sites, only one sign is required, which shall be erected on one of the sites in a location selected by the Architect and Owner.

END of
GENERAL CONDITIONS of the CONTRACT

SUPPLEMENT
to the
GENERAL CONDITIONS of the CONTRACT

1. Article 19 "Changes in the Work", Paragraph B (1) is modified as follows:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that do not include overhead and profit shall be justified by the Architect, approved by the Owner, and must also be approved by the Director.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

2. Article 19 "Changes in the Work", Paragraph B (3) (f) is modified as follows:

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that do not include overhead and profit shall be justified by the Architect, approved by the Owner, and must also be approved by the Director.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel,

watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

END of SUPPLEMENT to the
GENERAL CONDITIONS of the CONTRACT

ATTACHMENT B
to the
GENERAL CONDITIONS of the CONTRACT

(MANDATORY FOR PROJECTS COVERED THROUGH THE STATE INSURANCE FUND (SIF))

1. Article 37 "Contractor's and Subcontractors' Insurance", Paragraph E is modified as follows:

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance ~~or other property insurance~~ applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall ~~survive~~ not be applicable to loss or damage that occurs after final acceptance of the Work. ~~and continue to apply to insured losses to the Work or other property on or adjacent to the Project.~~

END of ATTACHMENT B to the
GENERAL CONDITIONS of the CONTRACT

State of _____)
County of _____)

CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535, as amended by ACT 2012-491)

DATE: _____

RE Contract/Grant/Incentive (describe by number or subject):
_____ by and between
_____ (Contractor/Grantee) and
_____ (State Agency, Department or Public Entity

The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of _____ with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535 of the Alabama Legislature, as amended by ACT 2012-491) which is described herein as "the Act."
2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure.

   BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit.

   a. Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, and foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.

   b. Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license, and any business entity that is operating unlawfully without a business license.

   EMPLOYER. Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

___ (a) The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.

___ (b) The Contractor/Grantee is not a business entity or employer as those terms are defined in Section 3 of the Act.

3. As of the date of this Certificate, the Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;
4. The Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.

Certified this _____ day of _____ 20____.

_____

Name of Contractor/Grantee/Recipient

By: _____

Its _____

The above Certification was signed in my presence by the person whose name appears above, on this _____ day of _____ 20____.

WITNESS: _____

_____

Printed Name of Witness

VENDOR DISCLOSURE STATEMENT INFORMATION AND INSTRUCTIONS

Section 41-16-82, *Code of Alabama* 1975 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000. The disclosure statement is not required for contracts for gas, water, and electric services where no competition exists, or where rates are fixed by law or ordinance. In circumstances where a contract is awarded by competitive bid, the disclosure statement shall be required only from the person receiving the contract and shall be submitted within ten (10) days of the award.

A copy of the disclosure statement shall be filed with the awarding entity and the Department of Examiners of Public Accounts, and if it pertains to a state contract, a copy shall be submitted to the Contract Review Permanent Legislative Oversight Committee. The address for the Department of Examiners of Public Accounts is as follows: 50N. Ripley Street, Room 3201,Montgomery,Alabama36130-2101. If the disclosure statement is filed with a contract, the awarding entity should include a copy with the contract when it is presented to the Contract Review Permanent Legislative Oversight Committee.

Pursuant to Section 41-16-84 (b), *Code of Alabama* 1975 the State of Alabama shall not enter into any contract or appropriate any public funds with any person who refuses to provide information as required.

Pursuant to Section 41-16-86, *Code of Alabama* 1975, any person who knowingly provides misleading or incorrect information on the disclosure statement shall be subject to a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00. Also, the contract or grant shall be voidable by the awarding entity.

Definitions as Provided in Section 41-16-81, *Code of Alabama* 1975

1. **Family Member of a Public Employee** – The spouse or a dependent of the public employee.

2. **Family Member of a Public Official** – The spouse, a dependent, an adult child and his or her spouse, a parent, a spouse's parents, or a sibling and his or her spouse, of the public official.

3. **Family Relationship** – A person has a family relationship with a public official or public employee if the person is a family member of the public official or public employee.

4. **Person** – An individual, firm, partnership, association, joint venture, cooperative, or corporation, or any other group or combination acting in concert.

5. **Public Official and Public Employee** - These terms shall have the same meanings ascribed to them in Sections 36-25-1(23) and 36-25-1(24), *Code of Alabama* 1975, (see below) except for the purposes of the disclosure requirements of this article, the terms shall only include persons in a position to influence the awarding of a grant or contract who are affiliated with the awarding entity. Notwithstanding the foregoing, these terms shall also include the Governor, Lieutenant Governor, members of the cabinet of the Governor, and members of the Legislature. (Note: The definitions for public official and public employee are now denoted as Sections 36-25-1 (25) and 36-25-1 (26), *Code of Alabama* 1975. However, Section 41-16-86 (5), *Code of Alabama* 1975 has not been codified to reflect such updates.)

Section 36-25-1(25), *Code of Alabama* 1975, defines a **public employee** as any person employed at the state, county or municipal level of government or their instrumentalities, including governmental corporations and authorities, but excluding employees of hospitals or other health care corporations including contract employees of those hospitals or other health care corporations, who is paid in whole or in part from state, county, or municipal funds. For purposes of this chapter, a public employee does not include a person employed on a part-time basis whose employment is limited to providing professional services other than lobbying, the compensation for which constitutes less than 50 percent of the part-time employee's income.

Section 36-25-1(26), *Code of Alabama* 1975, defines a **public official** as any person elected to public office, whether or not that person has taken office, by the vote of the people at state, county, or municipal level of government or their instrumentalities, including governmental corporations, and any person appointed to a position at the state, county, or municipal level of government or their instrumentalities, including governmental corporations. For purposes of this chapter, a public official includes the chairs and

vice-chairs or the equivalent offices of each state political party as defined in Section 17-13-40, *Code of Alabama* 1975.

Instructions

Complete all lines as indicated. If an item does not apply, denote N/A (not applicable). If you cannot include required information in the space provided, attach additional sheets as necessary.

THE DISCLOSURE STATEMENT MUST BE SIGNED, DATED, AND NOTARIZED PRIOR TO SUBMISSION.

- Disclosure Form (67KB PDF; Manual Fill-in)
- Disclosure Form (122KB PDF; Online Fill-in)

Updated: 03/2012

State of Alabama

Disclosure Statement

Required by Article 3B of Title 41, Code of Alabama 1975

ENTITY COMPLETING FORM

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER ( )

STATE AGENCY/DEPARTMENT THAT WILL RECEIVE GOODS, SERVICES, OR IS RESPONSIBLE FOR GRANT AWARD

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER ( )

This form is provided with:

☐ Contract ☐ Proposal ☐ Request for Proposal ☐ Invitation to Bid ☐ Grant Proposal

Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify below the State Agency/Department that received the goods or services, the type(s) of goods or services previously provided, and the amount received for the provision of such goods or services.

STATE AGENCY/DEPARTMENT	TYPE OF GOODS/SERVICES	AMOUNT RECEIVED

Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify the State Agency/Department that awarded the grant, the date such grant was awarded, and the amount of the grant.

STATE AGENCY/DEPARTMENT	DATE GRANT AWARDED	AMOUNT OF GRANT

1. List below the name(s) and address(es) of all public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF PUBLIC OFFICIAL/EMPLOYEE	ADDRESS	STATE DEPARTMENT/AGENCY

2. List below the name(s) and address(es) of all family members of public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the public officials/public employees and State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF FAMILY MEMBER	ADDRESS	NAME OF PUBLIC OFFICIAL/ PUBLIC EMPLOYEE	STATE DEPARTMENT/ AGENCY WHERE EMPLOYED

If you identified individuals in items one and/or two above, describe in detail below the direct financial benefit to be gained by the public officials, public employees, and/or their family members as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

Describe in detail below any indirect financial benefits to be gained by any public official, public employee, and/or family members of the public official or public employee as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

List below the name(s) and address(es) of all paid consultants and/or lobbyists utilized to obtain the contract, proposal, request for proposal, invitation to bid, or grant proposal:

NAME OF PAID CONSULTANT/LOBBYIST	ADDRESS

By signing below, I certify under oath and penalty of perjury that all statements on or attached to this form are true and correct to the best of my knowledge. I further understand that a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00, is applied for knowingly providing incorrect or misleading information.

Signature Date

Notary's Signature Date Date Notary Expires

Act 2001-955 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000.

Revised: 03/2012

LIST OF SUBCONTRACTORS AND MAJOR SUPPLIERS
Attachment to ABC Form C-3
Proposal Form

The apparent low bidder shall submit to the Owner and the Architect a complete list of all subcontractors with their State of Alabama (Sub) Contractor's license numbers and all materials suppliers for subcontracts and/or material purchases in excess of $50,000.00.

02 4119 Selective Demolition:

Subcontractor Name/Phone: _____

License Number: _____

02 8200 Asbestos Removal:

Subcontractor Name/Phone: _____

License Number: _____

03 3000 Cast-In-Place Concrete:

Subcontractor Name/Phone: _____

License Number: _____

03 4500 Precast Architectural Concrete:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

03 4900 Glass Fiber Reinforced Concrete:

Subcontractor Name/Phone: _____

License Number: _____

03 5400 Cast Underlayment:

Subcontractor Name/Phone: _____

License Number: _____

04 2000 Unit Masonry Assemblies:

Subcontractor Name/Phone: _____

License Number: _____

05 1200 Structural Steel Framing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 2100 Steel Joists:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 3100 Steel Deck:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 4000 Cold Formed Metal Framing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 5000 Metal Fabrications:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 5100 Metal Stairs:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 5213 Pipe and Tube Railings:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

05 7000 Architectural Metal Railings:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

06 1000 Rough Carpentry:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

06 2000 Finish Carpentry:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

06 4100 Architectural Wood Carpentry:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 1150 Bituminous Dampproofing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 1300 Sheet Waterproofing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 2100 Thermal Insulation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 2119 Foamed-In-Place Insulation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 2500 Weather Barriers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 4213 Metal Wall Panels:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 5400 Thermoplastic Membrane Roofing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 6200 Sheet Metal Flashing and Trim:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 7100 Roof Specialties:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 7123 Gutters and Downspouts:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 7200 Roof Accessories:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 8100 Applied Fireproofing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 8400 Firestopping:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 9005 Joint Sealers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

07 9513 Expansion Joint Cover Assemblies:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 1113 Hollow Metal Doors and Frames:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 1416 Flush Wood Doors:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 3100 Access Doors and Panels:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 3473 Sound Control Doors:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 4313 Aluminum Framed Storefronts:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 4315 Aluminum Doors and Frames:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 4413 Curtain Walls:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 6300 Metal Framed Skylights:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 7100 Door Hardware:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 8000 Glazing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 8300 Mirrors:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

08 9100 Louvers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 0561 Common Work Results for Flooring Preparation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 0562 Remedial Floor Coating:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 2116 Gypsum Board Assemblies:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 3000 Tiling:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 5100 Acoustical Ceilings:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 5425 Linear Suspended Decorative Ceilings:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 6500 Resilient Tile Flooring:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 6620 Epoxy Terrazzo Flooring:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 6625 Terrazzo Tile Flooring:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 6813 Tile Carpeting:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 8413 Fixed Absorptive Panels:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 9000 Painting and Coating:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

09 9650 High-Performance Coatings – Specialty:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 1400 Signage

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 2113.13 Metal Toilet Partitions:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 2226.33 Folding Panel Partitions:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 2601 Wall and Corner Protections:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 2800 Toilet and Bath Accessories:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 4400 Fire Protection Specialties:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

10 7310 Metal Framed Translucent Canopy:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

11 5213 Projection Screens:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

12 2300 Roller Shades:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

12 9300 Site Furnishings:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

14 2400 Hydraulic Elevators:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

21 0010 Fire Suppression General:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

21 0090 Fire Suppression Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

21 3000 Fire Suppression Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 0010 Plumbing General

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 0090 Plumbing Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 0800 Commissioning of Plumbing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 1113 Facility Water Distribution Piping:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 2500 Plumbing Insulation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 4200 Plumbing Fixtures:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 4300 Drainage Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 4400 Water Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

22 4900 Petroleum, Oil and Lubricant Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 0010 HVAC General:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 0090 HVAC Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 0800 Commissioning of HVAC:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 0095 Testing, Adjusting and Balancing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 1000 Piping Valves and Accessories:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 1500 HVAC Underground Pre-Insulated Piping Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 2500 HVAC Insulation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 6000 Equipment:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 7000 Air Distribution:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

23 8000 Automatic Temperature Controls:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 0010 Electrical General:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 0090 Electrical Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 0800 Commissioning of Electrical Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1100 Raceways:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1120 Cable Trays:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1150 Underground Ducts, Manholes, and Handholes:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1200 Building Wire and Cable 600 Volt:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1210 Cables, Medium Voltage:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1300 Boxes:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1430 Wiring Devices:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1480 Connections to Motors and Equipment:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1700 Circuit and Motor Disconnects:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 1900 Supporting Devices:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 2000 Emergency Power Supply System:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 3210 Pad-Mount Transformers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4020 Service Entrance:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4400 Switchboards:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4500 Grounding:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4600 Dry Type Transformers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4710 Panelboards:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4750 Overcurrent Protective Devices:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 4760 Individual Service Breakers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 5010 Lamps:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 5020 Ballasts:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 5100 Luminaires:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 5910 Lighting Control Devices:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

26 6710 Surge Protective Devices:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

27 0000 Low Voltage Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

27 0010 Communications – General:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

27 0090 Communications – Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

27 1000 Structured Cabling Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

27 1100 Broadband Cabling Systems:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 1300 Security System:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 2300 Video Management:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 3010 Fire Detection and Alarm General:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 3090 Fire Detection and Alarm Performance Verification:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 3100 Fire Alarm System:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

28 3300 Two-Way Intercom System:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

31 1000 Site Clearing:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

31 2000 Earth Moving:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

31 3116 Termite Control:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 1216 Asphalt Paving:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 1313 Concrete Paving:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 1373 Concrete Paving Joint Sealants:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 1400 Unit Pavers:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 8400 Landscape Irrigation:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 9100 Planting:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 9119.13 Topsoil:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

32 9200 Turf and Grasses:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

33 4100 Storm Utility Drainage Piping:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

33 4600 Subdrainage:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

_____:

Subcontractor Name/Phone: _____

License Number: _____

Manufacturer Name/Phone: _____

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Subcontractor Name/Phone: ____

License Number: ____

Manufacturer Name/Phone: ____

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Subcontractor Name/Phone: ____

License Number: ____

Manufacturer Name/Phone: ____

_______________:

Subcontractor Name/Phone: ____

License Number: ____

Manufacturer Name/Phone: ____

_______________:

Subcontractor Name/Phone: ____

License Number: ____

Manufacturer Name/Phone: ____

Note: Bidder must name one and only one entity for each of the above trades. Where the subcontractor and supplier or manufacturers are required, list both in the spaces provided.

AUBURN UNIVERSITY

Quick Tips
Understanding the Acord Certificate of Insurance
For Large Public Works Projects

Auburn University – Risk Management & Safety

1. PRODUCER
Insurance Agent/Broker who issues certificate.

2. NAME OF INSURED
Must be the legal name of the contracting party.

3. TYPES OF INSURANCE
Must include the types of insurance required by contract.

4. POLICY FORM
"Claims made" or "occurrence" form.

5. GENERAL AGGREGATE
Should apply per-project.

6. NAMED ADDITIONAL INSURED
Auburn University, its Board of Trustees, Administrators, Faculty, Staff and Agents must be named additional insured. Coverage must be primary and non-contributory.

7. CERTIFICATE HOLDER
Must be Auburn University.

8. NAIC #
hould be included for each insurance company.

9. POLICY EFFECTIVE DATE
Must be prior to or coincidental with effective date of contract.

10. POLICY EXPIRATION DATE
If occurrence form, date must be on or after termination of contract.

11. LIMITS OF INSURANCE
Must be the same or greater than required by contract.

12. DESCRIPTION OF OPERATIONS
Place and event are sometimes described here. Policy must be endorsed to include a waiver of subrogation in favor of AU. Project Name/Number must be shown here.

13. NOTICE OF CANCELLATION
Must be modified as indicated; 30 days required.

14. AUTHORIZED REPRESENTATIVE
Must be signed or electronically stamped.

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 10/01/2012

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER
Reliable Insurance Agency
300 S. College Street, Suite 1900
Auburn, AL 36830
John Smith (334) 555-1234

CONTACT NAME:
PHONE (A/C, No, Ext):
FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	UNITED INSURANCE COMPANY	12345
INSURER B:	CAPITAL INSURANCE COMPANY	23456
INSURER C:	FEDERAL INSURANCE COMPANY	34567
INSURER D:	STATE INSURANCE COMPANY	
INSURER E:		45678
INSURER F:		

INSURED
Vendor Company
123 N. Dean Rd.
Auburn, AL 36830

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

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INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY							
	X COMMERCIAL GENERAL LIABILITY			BGL123456789	10/1/2012	10/1/2013	EACH OCCURRENCE	$1,000,000
	CLAIMS MADE [X] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$100,000
	X Contractual Liab $1M						MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER						GENERAL AGGREGATE	$2,000,000
	POLICY [X] PRO-JECT [ ] LOC						PRODUCTS - COMP/OP AGG	$2,000,000
								$
B	AUTOMOBILE LIABILITY			BAL132465798	10/1/2012	10/1/2013	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS / NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
C	X UMBRELLA LIAB [X] OCCUR			UMB123456789	10/1/2012	10/1/2013	EACH OCCURRENCE	$4,000,000
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$4,000,000
	DED / RETENTION$							$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			WC123456789			X WC STATU-TORY LIMITS / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N / N/A						E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Auburn University, its Board of Trustees, Administrators, Faculty, Staff and Agents are named as additional insureds.

Coverage afforded the Additional Insured is Primary and Non-Contributory except for Employers' Liability.

Polices are endorsed to include a Waiver of Subrogation in favor of Auburn University.

Thirty (30) days notices of cancellation applies (10 day notices for non-payment of premium) in favor of the Additional Insured.

CERTIFICATE HOLDER

Auburn University
Risk Management & Safety
316 Leach Science Center
Auburn University, AL 36849

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS

AUTHORIZED REPRESENTATIVE

ACORD 25 (2010/05) The ACORD name and logo are registered marks of ACORD

The ACORD Certificate of Insurance

1. THE PRODUCER: Produces or orders Certificate for insured; answers questions, revises certificate to meet contract requirements.
2. NAME OF INSURED: Must be legal name of contracting party.
3. TYPES OF INSURANCE: Must include types required by contract.
4. POLICY FORM: Will indicate claims-made or occurrence form; see "8. Policy Expiration Date",and Glossary for additional information.
5. NAMED ADDITIONAL INSURED: The Certificate must state, either under Description of Operations or by attached endorsement, that Auburn University, its Board of Trustees, Administrators, Faculty, Staff and Agents are additional insured.
6. CERTIFICATE HOLDER: Must be Auburn University; address must include campus, department, contact person.
7. POLICY EFFECTIVE DATE: Must be prior to or coincidental with effective date of contract.
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12. AUTHORIZED REPRESENTATIVE: Must be signed or electronically stamped by an authorized representative of Producer.

AUBURN UNIVERSITY

Auburn University – Risk Management & Safety

Quick Tips
Understanding the Acord Certificate of Insurance For Small Public Works Projects

1. PRODUCER
Insurance Agent/Broker who issues certificate.

2. NAME OF INSURED
Must be the legal name of the contracting party.

3. TYPES OF INSURANCE
Must include the types of insurance required by contract.

4. POLICY FORM
"Claims made" or "occurrence" form.

5. GENERAL AGGREGATE
Should apply per-project.

6. NAMED ADDITIONAL INSURED
Auburn University, its Board of Trustees, Administrators, Faculty, Staff and Agents must be named additional insured. Coverage must be primary and non-contributory.

7. CERTIFICATE HOLDER
Must be Auburn University.

8. NAIC #
Should be included for each insurance company.

9. POLICY EFFECTIVE DATE
Must be prior to or coincidental with effective date of contract.

10. POLICY EXPIRATION DATE
If occurrence form, date must be on or after termination of contract.

11. LIMITS OF INSURANCE
Must be the same or greater than required by contract.

12. DESCRIPTION OF OPERATIONS
Place and event are sometimes described here. Policy must be endorsed to include a waiver of subrogation in favor of AU. Project Name/Number should be shown here.

13. NOTICE OF CANCELLATION
Must be modified as indicated; 30 days required.

14. AUTHORIZED REPRESENTATIVE
Must be signed or electronically stamped.

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 10/01/2012

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B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS HIRED AUTOS SCHEDULED AUTOS NON-OWNED AUTOS			BAL132465798	10/1/2012	10/1/2012	COMBINED SINGLE LIMIT (Ea accident) $1,000,000 BODILY INJURY (Per person) $ BODILY INJURY (Per accident) $ PROPERTY DAMAGE (Per accident) $ $
	UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $						EACH OCCURRENCE $ AGGREGATE $ $
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N N/A If yes, describe under DESCRIPTION OF OPERATIONS below			WC123456789			X WC STATU-TORY LIMITS OTH-ER E.L. EACH ACCIDENT $1,000,000 E.L. DISEASE - EA EMPLOYEE $1,000,000 E.L. DISEASE - POLICY LIMIT $1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)
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Auburn University
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316 Leach Science Center
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STATE OF ALABAMA
BUILDING COMMISSION
770 Washington Avenue, Suite 444
Montgomery, Alabama 36130
(334) 242-4082 FAX (334) 242-4182

PRE-CONSTRUCTION CONFERENCE CHECKLIST

The following recommended topics to be covered during a Preconstruction Conference. Contact the BC Project Inspector by telephone at least fourteen (14) days prior to scheduling the conference in order to give him time to coordinate his schedule accordingly.

**Item shall be discussed while Owner is present.*

	*1. Name and relationship to job of local Owner personnel
	2. Public officials involved
	3. Names of architect personnel involved
	4. Provide e-mail addresses on Pre-Construction Sign-in sheet
	5. Construction sets of plans available to contractor
	6. Verify alternates accepted, etc.
	7. Approved list of sub-contractors
	8. Approved cost breakdown & Progress Schedule
	9. Method of approving monthly payment requests
	10. Change Orders - Documentation - no prior work, **unless authorized in writing**
	11. Shop drawings, time to process
	12. Advance notice for required inspections The contractor will notify the architect by email of the date the project will be ready for an inspection by the Building Commission. Inspections must be requested 14 days in advance. When the BC Inspector confirms the inspection date and time, the architect will send an email confirming the inspection date and time to all parties as well as a copy to Jennie.Jones@bc.alabama.gov. Cancellations of any scheduled inspection must be received in writing no later than 48 hours prior to the scheduled inspection. If the inspection is cancelled, it will be rescheduled subject to the BC inspector's availability. Cancellations received less than 48 hours in advance shall incur a $1,500 re-inspection fee. If the contractor is not ready for the scheduled inspection he shall incur a $1,500 re-inspection fee.
	13. Inspection Minimum Requirements The following minimum requirements listed below are provided to aid the contractors and architect in determining if a project is ready for a required inspection. Pre-Construction Conference: Required Attendees: Contractor, Owner, Architect, Major Subs • Fully-executed construction contract and Notice to Proceed • Verification of payment of permit fee • Contractor's statement of responsibility and quality assurance plan (storm shelter) • Fire alarm contractor's certification (from State Fire Marshall) • ADEM permit, if more than one acre of land is disturbed Pre-Construction Conference for Storm Shelter: Required Attendees: Contractor, Owner, Architect, Structural Engineer, Major Subs, Special Inspections Representative • BC inspector must have received the contractor's statement of responsibility and quality assurance plan.

13. Pre-Roofing Conference: Required Attendees: Contractor, Owner, Architect, Roofing Sub, Roofing Manufacturer's Representative
    - Roofing submittals must be approved by the architect prior to pre-roofing conference
    - Roofing manufacturer must provide documentation that roof design and roofing materials meet code requirements for wind uplift and impact resistance
    - Copy of sample roof warranty

    Above Ceiling Inspections: Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subs
    - All work must be completed except for installation of ceiling tiles, and/or hard ceilings
    - Space must be conditioned
    - Permanent power must be connected unless otherwise arranged with the BC inspector
    - Grease duct must be inspected and approved by the BC inspector prior to fire wrapping and above-ceiling inspection

    Life Safety Inspections and Final Inspection: Required Attendees: Contractor, Owner, Architect, Engineers, Major Subs, Local Fire Marshal
    - Fire alarm certification
    - Kitchen hood fire suppression system certification
    - General contractor's 5-year roofing warranty (ABC Form C-9)
    - Roofing manufacturer's guarantee
    - Above ground and below ground sprinkler certifications
    - Completed certificate of structural engineer's observations (for storm shelter)
    - Emergency and exit lighting tests
    - Fire alarm must be monitored
    - Elevator inspection completed and certificate of operation provided by the State of Alabama Department of Labor
    - Boiler/vessels inspection completed and certificate of operation provided by the State of Alabama Department of Labor
    - Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or BC inspector)
    - Flush/pressure test for new and/or existing fire hydrants
    - Must have clear egress/access and emergency (for first responders) access to building
    - Must have ADA access completed

    Year-End Inspection: Required Attendees: Contractor, Owner, Architect, Engineers and/or Major Subs may be required
    - Owner's list of documented warranty items
    - Reconciliation of plan review and permit fees with BC shall be completed prior to inspection

14. Other inspections required before work is covered
    Local inspectors may require a full range of inspections for this project including footings, under-slab, etc. A wall inspection will be held before any finish paints are applied.

15. Inspection report distribution – weekly per Owner-Architect Agreement

16. Record Drawings, definition of, procedures, addenda posted, etc.

*17. Project sign and other job signs

18. Point of contact for job and cell phone

*19. Overall phasing of job

20. Contractor's duty to coordinate work of separate contractors

*21. Use of site and existing building, access drive, signs

*22. Use of existing toilets

*23. Coordinate any utilities supplied by Owner

*24. Coordinate outages and work in existing building with Owner

	25. Keeping existing exit paths open
	26. Routine job cleanup
	27. O.S.H.A. - Report all accidents - safety General Contractor's responsibility
	28. Contractor is reminded of obligation to comply with the Alabama Child Labor Law and E-verify
	29. Project limits
	30. Building location relative to critical property line, easement, setback, etc.
	31. Locating property line, corners, etc.
	32. Verify sanitary outfall before committing floor level, ADEM land disturbance permits
	33. Procedure if bad soil or rock is encountered: Geotech and special inspections
	34. Stockpiling topsoil
	35. Protecting trees
	36. Soil compaction, type soil, lab tests, etc.
	37. Soil Treatment, mix on site in presence of Job Superintendent
	38. Surveyor to check foundation wall if location critical
	39. Ready mix plant, file delivery tickets, slump tests, cylinders
	40. Quality of concrete work; concrete testing
	41. Inspections before pouring concrete
	42. What is expected of masonry work, mortar additive
	43. Problems with hollow metal - install proper fire labels
	44. Pre-roofing Conference - no roofing materials installed prior to conference, all roofing submittals and warranties must have been reviewed and approved by the Architect prior to the Pre-roofing Conference. Manufacturer's Representative must be present at Pre-roofing conference. The Roofing Manufacturer must show compliance with the IBC wind and impact-resistance requirements. Contractor shall video existing building interior and exterior prior to roofing operations and provide copy to Owner.
	45. General Contractor's Roofing Guarantee and Manufacturer's Roofing Guarantees must be presented to BC Inspector at Final Inspection and submitted with Certificate of Substantial Completion
	46. Potential conflict of mechanical and electrical equipment; shop drawings
	47. Return air plenums (no combustibles)
	48. Fire damper installation issues
	49. Certificate of Substantial Completion/Final Inspection
	50. Conduct of contractor's personnel. No interaction with staff and/or students. No foul language, no smoking or use of tobacco products, no drugs and no firearms on school property.
	51. Elevators/Pressure Vessels must be inspected and approved by the State of AL Dept. of Labor prior to final inspection.
	52. Life safety, fire alarm, sprinkler and kitchen hood fire suppression systems must be complete and certified prior to final Inspection. Also, exit and emergency lighting must be complete.
	53. Comply with ADA requirements: plumbing fixture heights, toilet partition widths, turnaround, signage, parking lot striping, etc.
	54. Coordinate with local fire authority to assure access to the building for fire fighting equipment during construction and before final acceptance.

	55. Light gauge metal roof framing and/or wood truss framing to be inspected by the structural engineer.
	56. Comply with fire hydrant requirement, coordinate with local Fire Authority or State Fire Marshal.
	57. Craft-faced insulation is not to be installed exposed.
	58. Fire alarm contractor must be certified through State Fire Marshal's Office.
	59. All sprinkler system valves must be electrically supervised and chain locked.
	*60. Fire alarm monitoring requirements
	61. Storm Shelter requirements a. Contractor's Statement of Responsibility and Quality Assurance Plan – Provide paperwork at Pre-Construction Conference b. Certification of Structural Observations from the Structural Engineer of Record must be attached to the Certificate of Substantial Completion form.
	62. Third-party inspections/special inspections
	63. Release of retainage – 30 days to complete punch list and closeout
	*64. Sales tax savings
	65. Project Closeout - precedes Final Payment a. Warranties b. Operating and Maintenance Manuals c. As-built Drawings d. Other requirements
	66. Advertisement of Completion - start ad after substantial completion a. for projects less than $50,000, Owner advertises 1 week b. for projects $50,000 or more, Contractor advertises for 4 consecutive weeks
	67. Time Extensions
	68. Final Pay Application checklist

Auburn University Safety Specification

1. GENERAL

a. Safety is a critical requirement of this contract. As such, the safe performance of work by the Prime Contractor and its subcontractors is a contract requirement. Failure by the Prime Contractor or its subcontractors to work safely shall be viewed by Auburn University and its Project Manager as a failure to execute contract requirements.

b. As a specialist in its field of work, the Prime Contractor accepts complete responsibility for performing its work safely. This includes sole responsibility for the health and safety of its employees, agents, subcontractors (and their employees) and any other person on or adjacent to the area. Prime Contractor's responsibility includes compliance with all current laws, codes, ordinances, rules, regulations, standards and requirements of applicable public and private agencies and authorities ("Laws"). Prime Contractor must take all measures and safeguards necessary to protect: (1) employees, (whether or not working for the Prime Contractor), (2) employees and agents of Auburn University, the Construction Manager and other Contractors, (3) members of the general public and (4) public and private property.

c. Auburn University and the Prime Contractor recognize that the Prime Contractor is an independent contractor, with responsibility for its means and methods and the safety of its workers and that Auburn University are not intended to be and shall not be considered an employer of Prime Contractor's employees. As such, it shall be Prime Contractor's duty to monitor the performance and practices of its employees and subcontractors for safety, to insure that the practices and methods of performing the work are safe and to immediately stop any unsafe practices by its employees or its second or subsequent tier subcontractors ("subcontractors") or their employees. No actions taken by Auburn University to monitor practices or performance of the work for safety or to stop any unsafe practices by Prime Contractor or its subcontractors shall be construed to suggest or imply that Auburn University has or has assumed any obligation or duty to take such actions.

d. Prime Contractor accepts complete responsibility for compliance with safety procedures and policies issued by Auburn University and/or contained in the Contract Documents and compliance with all applicable Laws, relating to health or safety, including, but not limited to the Occupational Safety and Health Act of 1970, as amended, and the regulations and standards of the Occupational Safety & Health Administration and similar state agencies ("OSHA") ("Health and Safety Laws"). Prime Contractor shall cooperate and coordinate with Auburn University, and all other Contractors and subcontractors in their respective safety programs. In exchange for one hundred dollars ($100.00) and other good and valuable consideration, the amount of which is included in the Price, Prime Contractor agrees to defend, indemnify and hold harmless Auburn University and its officers, directors, agents and employees from and against any loss, liability, expense (including attorneys' fees), citations, assessments, fines or penalties resulting from any citation for, allegation of or violation of any Health or Safety Laws attributable in whole or part to the acts or omissions of Prime Contractor, its subcontractors "or their agents or employees. Prime Contractor's obligations hereunder shall not be limited as to amount or type of damages by the provisions of any worker's compensation act, disability act or other employee benefit act or by any insurance policy.

e. All obligations and requirements of "Prime Contractor" in this document also apply to Prime Contractor's subcontractors. No person or entity performing work for or on behalf of Prime Contractor is excluded from compliance.

f. Prime Contractor shall comply with the safety-related recommendations of Auburn University and insurance companies having an interest in the Project unless such recommendations would violate applicable Laws. Prime Contractor shall provide written responses to any Auburn University or insurance company safety inspection outlining corrective actions and action plans to prevent recurrence.

2. THE ROLE OF THE AUBURN UNIVERISTY PROJECT MANAGER REGARDING SAFETY:

a. The Auburn University Project Manager (hereafter referred to as "AU Project Manager (AU PM)" shall serve as Auburn University's agent on this project to ensure that all contract requirements relative to safety and the safe performance of work are being met. The AU Project Manager shall monitor the work performed to determine whether the Prime Contractor's safety program is resulting in compliance with the contract requirements for safety. The AU Project Manager shall take actions as necessary with the Prime Contractor to ensure that work is being completed in compliance with the safety requirements of this contract.

b. The AU Project Manager may conduct and/or ensure the following meetings are conducted to help ensure safe execution of the work:

- AU PM conduct - Pre-bid meeting(s) – safety is first agenda item.
- AU PM conduct - Pre-Construction meeting(s) – safety is first agenda item.
- AU PM conduct - Pre-installation meeting(s) – quality and safety on tasks is the focus.
- Prime Contractor conduct - Project Safety Meetings with subcontractor project managers and superintendents.
- Prime Contractor conduct - Prime Contractor toolbox safety meetings.

The Prime Contractor shall conduct Project Safety Meetings safety meetings with its subcontractor project managers and superintendents on a regular basis to ensure coordination of safety efforts and to ensure the safe execution of work.

3. AREAS WHERE AUBURN UNIVERSITY'S SAFETY REQUIREMENTS EXCEED OSHA'S

a. As stated in paragraph 1 above, OSHA safety requirements are the standard to which the Prime Contractor and its subcontractors must adhere.
b. However, in the following areas, the safety requirements on this contract will exceed OSHA requirements:

1926.21 – Safety Training & Education (Confined Space):

Auburn University requires subcontractors engaged in confined space work follow procedures similar to general industry standards (1910.146) as no confined space standards have been established for construction.

1926.25 – Housekeeping:

Auburn University requires continuous housekeeping efforts.

1926.28 – PPE

- Shirts with sleeves are required at all times
- Long pants are required at all times
- Substantial soled work shoes or boots are required at all times.
- Task Specific work gloves 100%

1926.50 – Medical Services & First Aid

Regardless of reasonable accessibility to a medical care facility Auburn University requires each contractor to have a minimum of two (2) trained employees in first aid & CPR available at all times while the Contractor is working on site.

1926.100 – Head Protection

Auburn University requires hardhats be worn at all times in construction areas regardless of overhead exposures (exception – cab of covered equipment)

1926.102 – Eye Protection

Auburn University requires eye protection be worn at all times in construction areas regardless of exposure.

1926.404 – Wiring Design & Protection (Electrical)

Auburn University does not permit the use of an assured grounding program on site in lieu of use of GFCI (Ground Fault Circuit Interrupters).

1926.416 – General Requirements (Electrical)

Electrical tie-ins shall be conducted only on de-energized systems. If a condition makes this impossible, then a pre-task meeting with Auburn University is required. All energized work "live work" shall conform to NFPA 70E (Standard for Electrical Safety in the Workplace).

Auburn University does not permit electrical tape to be used to repair incidental damage to the outer jacket insulation of an extension cord. The cord must be repaired or replaced.

1926.400-.499 Subpart K – Electrical

Extension cords used with portable tools must be of a heavy duty 3-wire type and must be 12 gauge or greater.

1926.451(g) – General Requirements (Scaffolding)

Auburn University requires scaffolds have all open ends protected at 6 feet or greater.

1926.451(g)(2) – General Requirements (Scaffolding/Fall Protection)

Auburn University requires fall protection be used during scaffold erection and dismantling. The decision is not left with the competent person to determine feasibility of fall protection.

1926.500-.503 Subpart M – Fall Protection

100% Fall Protection is required above 6 feet. (Note: also see paragraph 16 of this specification section)

Note: Exceptions provided within the Occupational Safety and Health construction standards for the use of non-conventional fall protection measures (i.e., fall protection plans, controlled access zones, safety monitors) are not permitted by Auburn University. Therefore, where any employee is exposed to a fall (6) six feet or greater, where passive fall protection cannot or has not been installed (i.e., guardrails, safety nets, etc.), Subcontractor shall provide its employees with a fall restraint/fall arrest system that protects its employees 100% of the time. This requirement does not apply to ladder access and egress unless required by OSHA.

1926.1401-1442 – Crane Inspection

Auburn University requires that the annual inspection be completed by a third party prior to the crane being used on the project. Auburn University does not accept an annual inspection by a Prime Contractor "competent" person or company employee as proof. (Note: also see paragraph 16 of this specification section)

1926.1053 – Ladders

Auburn University requires that job built ladders be built in accordance with ANSI a14.4. Portable metal ladders shall not be used on the construction project

c. The Prime Contractor and its subcontractors shall conform to these more stringent safety requirements as part of the terms of this contract.

4. **SITE SAFETY PLAN**

a. Proper planning is the key to safe performance. This planning will be accomplished through the submittal of a Site Safety Plan.

b. The Site Specific Safety plan shall be considered an Additional Submittal as identified in Supplemental Instructions to Bidders (ABC Form C-2), required within ten (10) days of AU notification of low apparent bidder. In order to prevent delay in contract execution, the awarded contractor must submit a project site specific safety plan in accordance with this document, to the Owner within ten (10) days of notification. For each day delay in delivery of an acceptable submittal, a day will deducted by change order from the contract duration. Regardless no work on site shall be performed until the site safety plan has been received. Delay in submitting a written Site Safety Plan will not constitute grounds for a contract schedule extension or delay claim related to Prime Contractor not being permitted to work. The Site Safety Plan must comply with applicable Laws and be updated as required as the project progresses.

c. Appendix A of this Attachment provides the required format for the Prime Contractor's Site Safety Plan. All items and topics listed in Appendix A must be covered, as applicable, in the Prime Contractor's Site Safety Plan. The AU Project Manager may waive certain sections deemed to be not applicable to this project or site, but in general, the requirement will be to cover all items listed.

d. Activity Hazard Analyses: A key component of the Site Safety Plan is Activity Hazard Analyses (AHA). Appendix B to this Attachment details the requirements for the Prime Contractor in submitting AHAs.

e. The AU Project Manager's review of, or comment on, the Site Safety Plan or any other safety plan, policy or procedure, shall not relieve the Prime Contractor of any responsibility or liability for the Site Safety Plan or such other safety plans, policies, or procedures. Upon review of the Site Safety Plan, the AU Project Manager reserves the right to advise Prime Contractor of deficiencies and recommend necessary changes or enhancements; however, Prime Contractor shall remain ultimately responsible for implementing a Site Safety Plan compliant with applicable Laws and for completing the work in accordance with the Site Safety Plan.

5. **OSHA 10 HOUR TRAINING**

a. Prime Contractor is responsible for ensuring that Prime Contractor and all of its subcontractors have at least one (1) member of their full-time supervisory staff on-site during all operations who has been certified or is currently enrolled in a 10-Hour OSHA Safety Training course. Prime Contractor and all of its subcontractors whose contract volume exceeds five million dollars ($5M) are required to have at least one additional OSHA 10-Hour certified person on site at all times. Prime Contractor and its subcontractor(s) shall provide the names of certified persons and a copy of their OSHA certification cards or enrollment certification to the AU Project Manager prior to project mobilization.

6. **SAFETY SUPERVISORS AND COMPETENT PERSONS**

a. Prime Contractor shall appoint one or more individuals to be responsible for safety on each contract ("Safety Supervisors"). The Safety Supervisors must be employed in a supervisory position, empowered by Prime Contractor to take corrective action; be present on the Project while work is being performed; and spend the amount of time necessary to ensure Prime Contractor's compliance with safety requirements. Prime Contractor shall submit, in writing, the name or names of the Safety Supervisors prior to project mobilization.

b. In addition to the Safety Supervisors, Prime Contractor must identify, for each operation, whether the Safety Supervisor(s) or another individual is the "competent person." The competent person must be an individual deemed and qualified as a competent person as required and defined by OSHA as: "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them" or such other definition as OSHA regulations may contain.

c. Prime Contractor acknowledges that the Prime Contractor's most senior level manager present on the Project while work is being performed is ultimately responsible for all safety management activities of said Prime Contractor and its subcontractors.

d. Should Auburn University reasonably determine that any Safety Supervisor and/or competent persons or manager is not fulfilling his duties, The AU Project Manager may direct Prime Contractor to remove and replace said individual at Prime Contractor's sole expense without delay. The AU Project Manager's right to take such action shall not be construed as an obligation on the part of the Auburn University to do so or as an obligation by Auburn University to evaluate, monitor, or control Prime Contractor's Safety Supervisors, competent persons or managers.

7. **COMMUNICATION WITH NON-ENGLISH SPEAKING WORKERS**

a. Prime Contractor shall provide a translator at all times when Prime Contractor or its subcontractors has non-English speaking workers on-site.

b. This individual must be identified to the AU Project Manager prior to mobilization and shall be present during all work operations, specifically including, but not limited to, all employee meetings, when Prime Contractor (or its second or subsequent tier subcontractors) has non-English speaking workers on site.

8. **PRESENCE OF INDIVIDUALS TRAINED IN FIRST AID/CPR**

a. Prime Contractor is responsible for ensuring that Prime Contractor and all of its subcontractors have a minimum of two (2) full time persons trained in first aid and CPR ("First Aid Responder") who is on site at all times while Prime Contractor or its subcontractors are working

b. Prime Contractor will maintain written certification of First Aid Responder's training and make documentation available to the AU Project Manager upon request.

c. Prime Contractor shall have adequate first aid and emergency medical equipment on site as necessary.

9. PRIME CONTRACTOR SAFE-START MEETING

a. Prior to mobilization, Prime Contractor and its subcontractors must conduct a Safe-Start Meeting. Prime Contractor maintains responsibility for scheduling and conducting this meeting with its subcontractors. The purpose of the Safe Start Meeting is to ensure that all Prime Contractor personnel and their subcontractors have been briefed on the Project safety Plan, project site hazards, and the safety policies, practices, and procedures to be utilized during the duration of the project. The Prime Contractor shall invite the AU Project Manager to the Safe Start meeting.

b. No work on-site shall be performed until the Safe Start Meeting has been completed and Prime Contractor has submitted all documentation required by the AU Project Manager. Delay in scheduling this meeting and/or providing required documentation will not constitute grounds for a contract schedule extension or delay claim related to the Prime Contractor or its subcontractors not being permitted to work.

10. PROJECT SAFETY MEETINGS

The Prime Contractor shall lead project safety meetings between the Prime Contractor and all the subcontractors on the project. The purpose of these meetings shall be to review: (1) safety problems on the job site, (2) courses of action to take to eliminate those safety problems, (3) hazards associated with upcoming activities of the Prime Contractor and subcontractors and (4) the Prime Contractor's and subcontractor's plans to mitigate those hazards.

11. SAFETY TRAINING AND ORIENTATION

a. Prime Contractor acknowledges its responsibility to provide its employees and the employees of its subcontractors with a Project specific orientation prior to performing work on the Project. Topics covered must be relevant to the tasks the employees will be required to complete on the Project in addition to any site-specific requirements. Prime Contractor shall maintain training documentation on-site and make it available for review by the AU Project Manager if requested.

b. The AU Project Manager may require Prime Contractor's employees and the employees of its subcontractors to participate in an additional project orientation conducted by the AU Project Manager. This training will not replace the orientation training referenced in section (8.a) and Prime Contractor acknowledges that any project orientation conducted by the AU Project Manager is solely for the purpose of an introduction to the Project site. Prime Contractor shall be solely responsible for conducting Project site hazard assessments, for providing appropriately trained competent persons and Safety Supervisors and for orientation and training of all of its employees on the Project site.

c. Where applicable Laws require the performance of certain duties by individuals having specified training or certification, Prime Contractor agrees that such duties shall be performed only by individuals having the required training or certification at no additional cost to Auburn University even if new or additional training is necessary to meet such requirements. Prime Contractor shall be responsible for determining what, if any, additional training is required and prior to commencing work shall provide all training, including any specialty training required by OSHA and other public or private authorities, to its employees and employees of its subcontractors. Prime Contractor shall maintain documentation of such training and make it available for inspection by the AU Project Manager for the purpose of confirming the training. Prime Contractor shall be solely responsible for assessing the content of the training and ensuring that all required training is completed.

d. Prime Contractor's supervisors and employees will be required to attend safety meetings when requested by the AU Project Manager. Prime Contractor must ensure its subcontractors' participation.

e. Prime Contractor must attend, at no cost to the Auburn University, all safety and health meetings relating to Prime Contractor's work on the Project site.

12. **ACCIDENT/INCIDENT REPORTING**

a. Any accident, incident, allegation or citation relating to Health and Safety Laws involving Prime Contractor or its subcontractors must be reported to the AU Project Manager immediately whether or not the incident results in employee injury, property damage, or damage or injury to any third party. A preliminary accident/incident report must be forwarded to the AU Project Manager before the end of the shift, and the completed report submitted within 24 hours unless the AU Project Manager grants Prime Contractor's written request for a time extension. In addition to the completed report, Prime Contractor shall also timely submit any additional documentation relating to the incident requested by the AU Project Manager or required by applicable Laws. Such documentation may include, but is not limited to, the following (a) a copy of "Employer's First Report of Injury" (in the event of an injury); (b) a copy of all property or casualty insurance claim reports; (c) a copy of any and all OSHA inspection or citation reports; and (d) a copy of any drug test obtained as the result of any incident.

b. In the event of an accident or incident involving Prime Contractor or its subcontractors, Prime Contractor will cooperate fully with the AU Project Manager in addressing any and all issues relating to the accident or incident, including making its employees and other resources and materials available for any investigations, meetings, insurance inspections, attorney reviews or other actions deemed necessary by the AU Project Manager. Prime Contractor acknowledges time is of the essence in providing the support the AU Project Manager deems necessary in response to an incident/accident. Should Contractor determine third party support is necessary to aid in investigation or mitigation of damages, Prime Contractor will request, arrange and pay for such support services.

c. Prime Contractor shall provide to the AU Project Manager, by the 5th day of each month, for each previous month in which it conducted or oversaw work on the Project, an Accident Statistical Report to include: all accidents that have occurred during the month, classification of such accidents, lost and/or restricted days, and total man-hours worked for the month. The report shall include cumulative totals and be broken-out for the Prime Contractor and its subcontractors.

13. **DRUG TESTING**

a. It is Auburn University policy that:

(1). All construction contractor personnel working at the University must be drug free.
(2). All prime contractors and their respective subcontractors will have an effective drug testing program.

b. The Prime Contractor, and their respective subcontractors, must certify at the start of the project, that their employees have been drug tested within the last 12 months from the date of the their respective NTP date.

c. The Prime Contractor and their respective subcontractors need to have a drug testing policy and program. All prime contractors shall advise Auburn University of what the company policy and program is for drug testing, how it is administered on a general basis and how it will be administered during the course of this contract. Documentation that the prime contractor has a Drug Free Workplace program certified by the State of Alabama will meet this requirement. Prime contractors must recertify with invoices that they are drug testing and tell how many test were performed during the invoice period.

d. The Prime Contractor and their subcontractors shall be required to drug test employees after a safety incident. At a minimum, the person involved in the incident and others who may have contributed to the incident shall be tested.

e. Auburn University reserves the right to request drug tests on any personnel who exhibit signs or behavior that they may be impaired or under the influence of drugs or who are operating in an unsafe manner. Auburn University reserves the right to conduct the following types of drug tests: random (groups of people), reasonable suspicion (individual), or project (all personnel) sweep testing.

f. Any personnel who fail to pass a drug test shall be removed from this project, and any other Auburn University project, for the duration of this contract.

14. **OSHA INSPECTIONS**

a. Prime Contractor shall contact the AU Project Manager immediately if an OSHA compliance officer arrives at the job site and shall inform the AU Project Manager of any employee complaint, incident, or other event that results in or is likely to result in an OSHA Inspection.

b. Prime Contractor shall forward a copy of any and all OSHA inspection or citation reports to the AU Project Manager upon receipt.

c. As part of indemnification set out in Article 18, should Auburn University receive an OSHA citation arising out of or relating to an act or omission of Prime Contractor or an act or omission for which Prime Contractor is also issued a citation, Prime Contractor will pay all costs associated with the defense of Auburn University during any proceedings with OSHA or related litigation or claims, including but not limited to attorney fees, expert witness fees, time associated with the Auburn University or its personnel in conjunction with this citation, costs, including but not limited to costs of photographs, and video tapes, and any fines. Additionally, if requested by the Auburn University, Prime Contractor will make available its employees, records and other resources the Auburn University deems necessary for its defense.

15. **HAZARD COMMUNICATION**

Prime Contractor is required by OSHA regulations to institute a hazard communications program, as part of which it must inform both the AU Project Manager and all other trade subcontractors on the Project site of any hazardous chemicals Prime Contractor is using on the Project. Prime Contractor must also provide the AU Project Manager and all other trade subcontractors with copies of Material Safety Data Sheets (MSDS), warn of the existence of any hazardous chemicals in the work area, ensure that any containers of hazardous chemicals are appropriately labeled, and maintain an inventory of any such chemicals.

16. **PHYSICAL CONDITIONS** – Topics identified within this section are included to add emphasis to Auburn University's requirements and are not intended to be all inclusive. As previously referenced, this specification provides summary guidance regarding certain health and safety items and should be reviewed in conjunction with and not as a substitute for the Safety Policy and all applicable Laws relating to the operations Prime Contractor will perform.

    a. **FALL PROTECTION**

        (1). Prime Contractor acknowledges and adopts the Auburn University zero tolerance policy for fall prevention and protection infractions and understands anyone found violating this policy may be removed from the site immediately.

        (2). Prime Contractor shall provide its employees with and enforce the use of 100% fall prevention/protection system whenever its employees are exposed to a fall (6) six feet or greater, including but not limited to any walking/working surface (horizontal and vertical) with an unprotected edge, leading edge work, roof work, steel erection, metal decking, pre-cast operations, overhand brick or block laying, or scaffold erection.

        (3). Prior to commencing work, Prime Contractor must provide the AU Project Manager with an OSHA compliant fall prevention and protection plan specific to the Prime Contractor's operations. Prime Contractor acknowledges and understands that the exceptions provided within the Occupational Safety and Health construction standards for the use of non-conventional fall protection measures (i.e., fall protection plans, controlled access zones, safety monitors) will not be permitted on this Project. Therefore, where any employee is exposed to a fall (6) six feet or greater, where passive fall protection cannot or has not been installed (i.e., guardrails, safety nets, etc.), Prime Contractor shall provide its employees with a fall restraint/fall arrest system that protects its employees 100% of the time. This requirement does not apply to ladder access and egress unless required by OSHA. Additionally, unless required by OSHA, this requirement does not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or an inspection after completion of construction work.

        (4). If Prime Contractor is required to remove any fall prevention or protection equipment previously installed on the Project to facilitate access to its work (e.g., perimeter guardrails, hole covers, etc.), Prime Contractor must first coordinate such removal with the AU Project Manager. Additionally, Prime Contractor is responsible for establishing alternate provisions to protect and warn its employees and other trades and Contractors that could be exposed to falls six (6) feet or greater as a result of the fall prevention equipment being removed. Further, upon completion of its work, and if materials installed by Prime Contractor do not eliminate the falling hazards, Prime Contractor must reinstall all previously installed fall prevention and protection equipment. If Prime Contractor fails to reinstall said fall prevention and protection equipment, reinstallation of this equipment may be done by others at Prime Contractor's cost and expense. In all instances, Prime Contractor shall remain solely responsible for the safe removal and reinstallation of such equipment.

(5). Prime Contractor acknowledges that in addition to providing personal fall arrest equipment to its employees, Prime Contractor shall provide fall protection training in accordance with OSHA standards. Prime Contractor shall maintain training documentation on-site and make it available for review by the AU Project Manager if requested.

(6). Prime Contractor's Safety Supervisor shall ensure appropriate set up and use of all fall prevention and protection components established to protect its employees and shall adhere to all OSHA and manufacturers' recommendations for proper set up and use.

(7). Prime Contractor shall thoroughly inspect each of its fall prevention and protection systems at least daily focusing on items including, but not limited to, whether the system is in working condition, whether the correct system is selected, whether the system is appropriately designed and instructions for use are being followed, whether the system is appropriately anchored, whether fall distances have been taken into consideration and whether all employees have been trained.

b. **PERSONAL PROTECTIVE EQUIPMENT**

(1). Prime Contractor shall be solely responsible for conducting a hazard assessment of the Project site in which it will be working, including an analysis of all of its work activities, for providing its employees with all safety items required by applicable Health and Safety Laws, for ensuring the appropriate personal protective equipment ("PPE") is being issued and used for the task at hand in accordance with applicable Laws (e.g., respiratory protection, ear plugs, fire retardant clothing, gloves, hard hats, safety glasses, and face shields). If specialty training is required for use of such equipment, Prime Contractor must ensure this training is provided to its employees.

(2). All Prime Contractor personnel shall wear ANSI Z87.1 approved safety glasses with approved side shields. Persons with prescription glasses shall wear ANSI Z87.1 approved prescription safety glasses with permanently attached side shields, or ANSI Z87.1 approved goggles to cover their existing glasses 100% of the time while working on the Project site.

(3). All Prime Contractor personnel shall wear non-metallic hard hats meeting ANSI Z89.1 specifications 100% of the time while working on the Project site. This requirement specifically includes all work completed during the finishing stages of the Project.

(4). Prime Contractor personnel shall wear personal clothing and footwear that is safe for the work and any jobsite exposure. At a minimum, full-length trousers and shirts with a minimum 4-inch sleeve are required. Work boots are required for all personnel on site.

c. **HOUSEKEEPING**

(1). The Prime Contractor shall take all necessary measures to keep the job site clean, to ensure debris is picked up and hauled off-site on a regular basis and in a timely manner, to store material in a manner that is safe and does not clutter the job site, and to police the job site or work area on a daily basis.

(2). Auburn University reserves the right to direct the Prime Contractor and their subcontractors to take additional measures to clean the job site if their efforts are unsatisfactory.

d. **CRANES, LIFTING, AND HOISTING EQUIPMENT**

(1). Prior to any crane or other lifting or hoisting equipment ("Crane") being brought onto site by or for the use of Prime Contractor, Prime Contractor shall provide the AU Project Manager with a copy of a current third party annual crane inspection. A certification sticker alone is not acceptable proof of the annual inspection.

(2). For any Crane requiring on-site assembly (e.g., lattice boom, tower, hydro with jib attached) Prime Contractor must provide the AU Project Manager with a post-set up inspection and certification letter certifying that the Crane has been assembled in accordance with manufacturer's specifications and a pre-use inspection has been conducted and the Crane meets all manufacturer's inspection criteria.

(3). Cranes requiring no on-site assembly must be inspected prior to use and Prime Contractor must provide the AU Project Manager with a certification letter certifying that a pre-use inspection has been conducted and the crane meets manufacturer's inspection criteria.

(4). All Cranes must be inspected daily and according to manufacturer's recommendations and the daily inspection log must be kept in the cab of the Crane and made available for review by the AU Project Manager.

(5). All Cranes being brought onto site must be equipped with a functioning anti-two-blocking device.

(6). Prime Contractor must determine if work is being performed in states or cities requiring licensing for Crane operators. If so, required copies of the operator's license must be submitted to the AU Project Manager prior to operation of the crane in addition to a letter attesting that upon review of the operator's experience and education the Crane operator is qualified and competent to operate the Crane or Cranes he/she will be required to operate on the Project. This letter must be submitted to the AU Project Manager prior to operation of the Crane.

(7). In states or cities where Crane operator licensing is not required Prime Contractor must certify licensing is not required. Additionally, Prime Contractors must be able to provide proof of certification from the National Council for the Certification of Crane Operators or a letter or other written document from the Prime Contractor or subcontractors' Crane training organization attesting that the operator meets all required certifications and that upon review of the Crane operator's experience and education the Crane operator is qualified and competent to operate the Crane or Cranes he/she will be required to operate on the Project. This letter must be submitted to the AU Project Manager prior to the operation of the Crane.

(8). Cranes may be operated only by individuals trained in their operation and possessing all required certifications as identified in Paragraph 13 vi & vii. Further, Prime Contractor must comply with said provisions outlined in Paragraph 16 vi & vii if Crane operators will be changed or replaced.

(9). Cranes must be used specifically for their designed purpose as established by the equipment manufacturer. Any deviation must be authorized by the equipment manufacturer and said authorization letter must be provided to the AU Project Manager.

e. **OTHER EQUIPMENT**

(1). All equipment brought on site by Prime Contractor must be inspected at intervals established either by OSHA or the equipment manufacturer, whichever is more often. Any deficiencies found during the inspection must be addressed immediately or the

equipment shall be taken out of service and locked and tagged out (in accordance with OSHA standards) until such time as it is repaired. Should the AU Project Manager observe a piece of equipment in disrepair and notify Prime Contractor, upon notification Prime Contractor must either repair the equipment immediately or take it out of service and lock and tag it out until such time as the repair can be made.

(2). Equipment must be used specifically for its designed purpose as established by the equipment manufacturer. Any deviation must be authorized by the equipment manufacturer and said authorization letter must be provided to the AU Project Manager.

(3). Equipment may be operated only by individuals trained in its operation and possessing all required certifications.

17. **INSPECTIONS**

a. Prime Contractor acknowledges that certain operations require its competent person to perform inspections and implement certain procedures prior to employees performing work. Prime Contractor shall insure that a competent person takes such actions (which may include, but is not limited to, scaffold inspection, excavation inspections, lock out tag out, confined space, hot work, and crane and equipment inspections). Prime Contractor acknowledges its responsibility to determine and ensure all policies regarding inspections and procedures are followed.

b. Prime Contractor's Safety Supervisor(s) or other competent person(s) shall inspect the Project daily for unsafe behaviors and conditions and shall address any such issues immediately. Prime Contractor shall, at least weekly, conduct a formalized project inspection and provide documentation of such inspection to the AU Project Manager.

18. **DISCIPLINARY ACTION/WORK STOPPAGE**

a. Prime Contractor shall enforce all disciplinary procedures the AU Project Manager may establish for the Project.

b. In the event that Prime Contractor or any of its employees or those of its Prime Contractors fail to comply with any health and safety requirements, or if Auburn University deems any part of the Work unsafe, the Project Manager may require Prime Contractor to stop work and/or remove any non-complying employees or supervisors. Prime Contractor shall not be entitled to any additional time or money as a result of the Project Manager stopping the work when the work was stopped due to the Project Manager's concern about safety deficiencies. Prime Contractor shall review and comply with the safety and health provisions of this contract, including, but not limited to this specification and its associated appendices, the Contract Documents and the Safety Policy. Failure to comply shall be considered a breach of contract.

c. Auburn University reserves the right to retain additional funds from Prime Contractor payments if their safety performance, or that of their subcontractors, is poor.

Appendix A to Auburn University Safety Specification
Project Site Safety Plans

Prior to commencing work on an Auburn University project; contractors must submit a Site Safety Plan to demonstrate the existence of a safety program and sufficient planning that will ensure that they can work safely at Auburn University. The prime contractor will write this plan for the specific work and hazards of this contract and the project site and implementing in detail the requirements for safety and occupational health. The Site Specific Safety Plan shall be considered an Additional Submittal as identified in Supplemental Instructions to Bidders, required within ten (10) days of project award. In order to prevent delay in contract execution, the awarded contractor must submit a project site specific safety plan in accordance with this document, to the Owner within ten (10) days of award. **The plan shall be developed by qualified personnel and shall be signed by a competent person AND a representative of the Prime Contractor's management**.

The Prime Contractor shall integrate all subcontractor work activities into the Site Safety Plan, make the program available to all contractor and subcontractor employees, and ensure all subcontractors integrate the provisions of the plan into their work activities.

The Site Safety Plan must include, at a minimum:

a. Title, signature and phone number of the plan preparer

b. Title, signature and phone number of the plan approver

c. Background information on the project: Contractor, contract number, project name, description of work to be performed and location of work to be performed, contractor accident experience such as OSHA 200 forms, corporate safety trend analysis, and a listing of phases of work and hazardous activities requiring hazard analysis.

d. Statement of safety & health policy

e. Administrative responsibilities for implementing the plan

f. Identification and accountability of personnel responsible for accident prevention

g. Means for controlling work activities of subcontractors and suppliers

h. Responsibilities of subcontractors

i. Plans for safety indoctrination of new employees

j. Plans for continued safety training

k. Activity Hazard Analyses

l. Local requirements for the hazards identified on the job site such as:

   1) Fall protection

2) Asbestos exposure
3) Confined space entry
4) Lock out/tag out
5) Excavations
6) Electrical safety
7) Machinery and mechanized equipment
8) Hand and power tools
9) Contingency plan for severe weather

m. Provisions for safety inspections to include:

1) Work site/material and equipment inspection
2) Means for recording inspection results
3) Timetable for correction of deficiencies
4) Procedures for follow-up inspections to ensure correction

n. Responsibilities for investigation and reporting accidents/incidents/exposures:

1) All accidents/incidents to the project will be investigated & reported within 24 hours
2) Accidents that result in a person being admitted to a hospital or significant property damage will be reported immediately to the Auburn University Project Manager. Contractors are responsible for notifying OSHA. The accident scene shall not be disturbed except for rescue and emergency measures until released by the investigating official.
3) First aid treatments shall be reported and recorded daily.

o. Responsibilities for maintaining accident data, reports and logs

p. Emergency response capabilities for disasters

q. Emergency Plans will include emergency phone numbers and shall be tested periodically. Plans shall include escape procedures, employee accounting following an emergency evacuation, rescue and medical duties, means of reporting emergencies and persons to be contacted.

r. Plans for maintaining job cleanup and safe access

s. Public safety requirements (fencing/signs)

t. Prevention of alcohol/drug abuse on the job

u. Plans must identify monthly supervisor safety meeting and weekly worker safety meetings. Meetings shall be documented including the date, attendance, subjects, and the name of individuals who conducted the meeting.

v. Fire Safety requirements must identify the use of safety cans in construction areas. Storage of fuel and flammable materials must be addressed in the safety plan.

w. Plans for hazard communication program must include:

1) A list of hazardous chemicals known to be present

2) Methods used to inform employees of the hazards
3) Containers must be present and labeled
4) MSDS for each hazardous chemical on site.

The contractor will not be allowed to start work until they have demonstrated the existence of a safety program and sufficient planning that will ensure that they can work safely at Auburn University. If any of the items presented or discussed at the Pre-Construction meeting or in subsequent review of the project site specific safety plan, result in the Auburn University project manager determining that the contractor has not planned the work sufficiently to work safely, they will not be allowed to start work until they have adequately planned the work. Any delays or costs, resulting from inadequate safety planning will be the responsibility of the contractor.

Appendix B to Auburn University Safety Specification
Activity Hazard Analysis

1. Prior to beginning ***EACH MAJOR PHASE OF WORK***, an activity hazard analysis (AHA) shall be prepared by the contractor performing that work. The contractor will not be allowed to start work on this major phase of work until they have demonstrated the existence of an activity hazard analysis (AHA) and sufficient planning that will help ensure that they can work safely on this activity. Each of these (AHA's) shall be submitted to the Auburn University Project Manager.

   The analysis will:

   - Define the activity being performed
   - Identify the sequence of work to be accomplished
   - Identify the specific hazards that are anticipated
   - Identify the control measures that shall be implemented to reduce each hazard to an acceptable level

2. Hazard analysis shall identify the principal steps to be accomplished in sequence to accomplish the operations. Equipment used in the operation shall be listed on the hazard analysis form. Inspection requirements for the equipment and machinery shall be listed on the hazard analysis form. Each step shall be analyzed to identify its potential hazards and a recommended control shall be identified to reduce the hazard to an acceptable level.

3. The contract documents will identify the minimum Activity Hazard Analyses that must be submitted on this project. The Prime Contractor shall submit other AHAs, as required to ensure the safe execution of its work and the work of its subcontractors. Auburn University has authority to order the Prime Contractor to submit additional AHAs as they deem necessary.

4. When the Site Specific Safety Plan is initially submitted by the Prime Contractor for the project, the Prime Contractor shall list all of the AHAs it proposes to submit. The Auburn University Project Manager will review this list for completeness, and may require additional AHAs to be submitted. The Auburn University Project Manager will maintain a log of required AHAs and track their receipt and approval throughout the course of the contract.

5. Detailed, completed AHAs shall be submitted by the Prime Contractor no less than 30 days prior to the start of the activity or major phase of work.

6. The performance of the activity in a safe manner is the sole responsibility of the Prime Contractor. The review of the AHA by the Auburn University Project Manager is to gauge the completeness of the safety planning effort by the Prime Contractor and their preparedness to mitigate the hazards and execute the work safely in accordance with contract requirements. The review of the AHA by Auburn University in no ways implies or conveys liability or responsibility from the Prime Contractor to Auburn University.

7. The preferred format for the AHAs is attached to this Appendix.

Work Phase:		**Activity**
Analyzed by/Date		Reviewed by/Date
Principal Steps Taken	**Potential Hazards**	**Recommended Controls or Risk Mitigation Measures to be**
Identify the potential principal steps involved and the sequence of work activities	Analyze each principal step for its potential hazard.	Develop specific controls for each

Equipment to be used	**Inspection Requirements**	**Training Requirements**
List equipment/machinery to be used in conducting the Work activities	List inspection requirement for equipment/machinery listed	Determine requirement for worker training. Include Hazard Communication/Fall Protection Confined Space/Lockout & Tagout/Asbestos

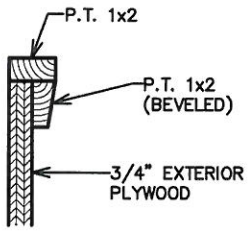
Work Phase:		**Activity**
Analyzed by/Date		Reviewed by/Date
Principal Steps Taken	**Potential Hazards**	**Recommended Controls or Risk Mitigation Measures to be**

Equipment to be used	**Inspection Requirements**	**Training Requirements**

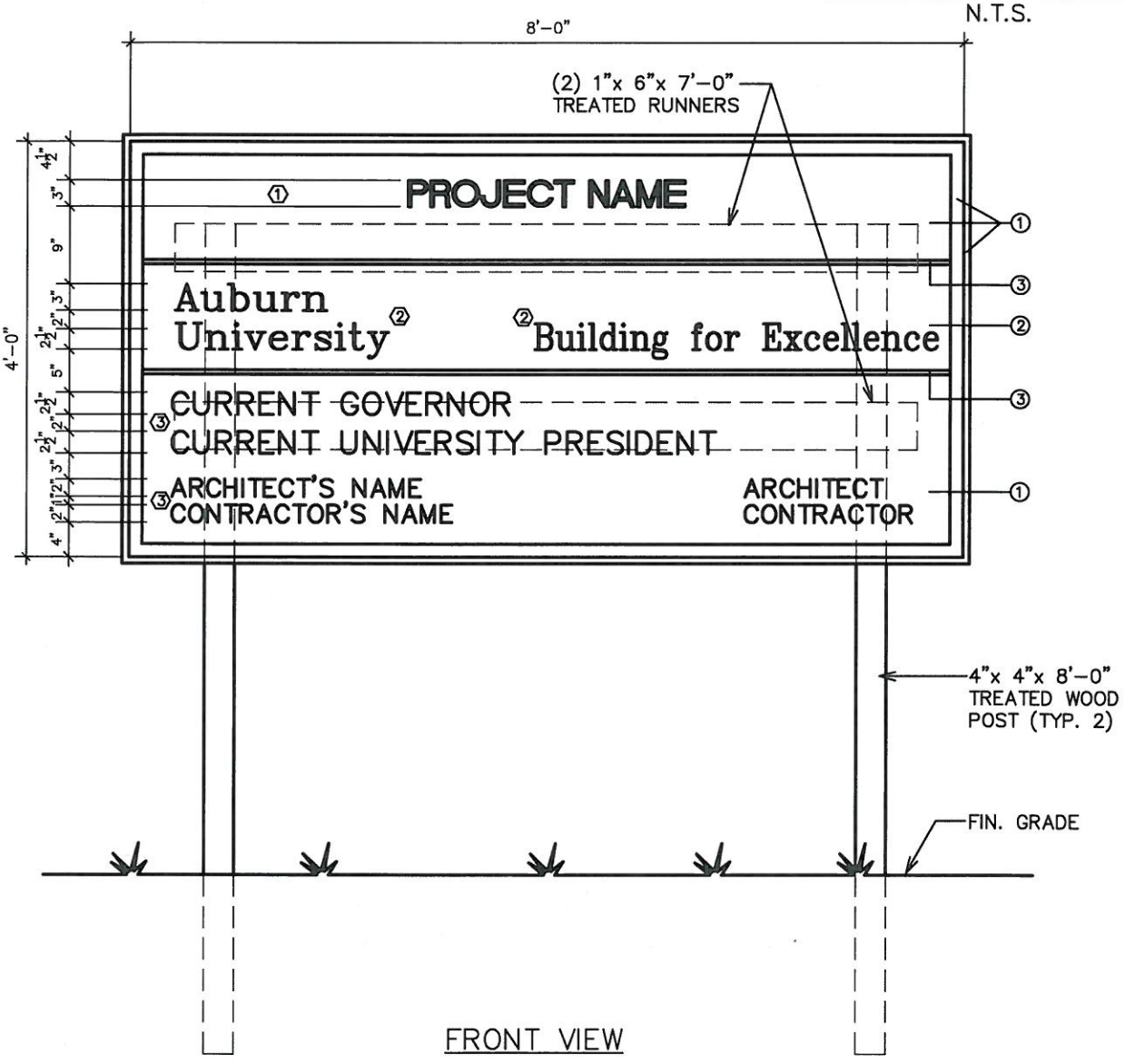
AU FORM C-15
NOVEMBER, 2015

A.U. DETAIL OF NON-CM PROJECT SIGN

LETTER TYPES		COLORS	
① HELVETICA MEDIUM	(COLOR 3)	① PITTSBURG D4752 "GREY VELVET"	(EXTERIOR)
② UNIVERSITY ROMAN	(COLOR 3)	② PITTSBURG N7243 "EGYPTIAN RUST"	(EXTERIOR)
③ HELVETICA LIGHT	(COLOR 3)	③ PITTSBURG P2537 "BLOSSOM WHITE"	(EXTERIOR)



DETAIL OF WOOD SURROUND
N.T.S.



FRONT VIEW

NOTES:

1. SIGN TO BE CONSTRUCTED OF 3/4" EXTERIOR GRADE PLYWOOD.
2. PAINT WITH 2 COATS BEST GRADE EXTERIOR PAINT BEFORE LETTERS ARE PAINTED.
   OPTION:
   IN LIEU OF PAINTED LETTERING ON PLYWOOD, A CORRUGATED PLASTIC SIGN (DISPLAYING THE SAME LETTERING, LAYOUT, AND COLORS AS ABOVE) MAY BE SECURED DIRECTLY TO UNPAINTED EXTERIOR GRADE PLYWOOD.
3. SIGN SHALL BE PLACED IN A PROMINENT LOCATION AND EASILY READABLE FROM EXISTING STREET OR ROADWAY.
4. SIGN SHALL BE MAINTAINED IN GOOD CONDITION UNTIL PROJECT COMPLETION.

CONTRACTOR'S PERIODIC ESTIMATE FOR PAYMENT
Incorporating Sales and Use Tax Agreement
AUBURN UNIVERSITY

AU Form C-10
November 2015

Project: _____ **Project Number:** _____

Location _____ **P.O. #** _____

Contractor: _____ **Address:** _____

Architect: _____ **Address:** _____

Pay Request # _____ **Date:** _____

Item No.	Description (categories may be modified)	Original Estimate	Percentage Complete	Amount Complete
1	General Requirements			$0.00
2	Sitework			$0.00
3	Concrete			$0.00
4	Masonry			$0.00
5	Metals			$0.00
6	Carpentry			$0.00
7	Roofing & Waterproofing			$0.00
8	Doors & Windows			$0.00
9	Finishes			$0.00
10	Specialities			$0.00
11	Equipment			$0.00
12	Furnishings			$0.00
13	Special Construction			$0.00
14	Conveying Systems			$0.00
15	Mechanical			$0.00
16	Electrical			$0.00
	TOTAL ORIGINAL CONTRACT	$0.00	#DIV/0!	$0.00

Note: Contractor shall attach a detailed breakdown of the above categories as required by Auburn University.
see page below if requested to supply breakdown

AU Form C-10
November 2015

CONTRACTOR'S PERIODICAL ESTIMATE FOR PAYMENT
Incorporating Sales and Use Tax Agreement
AUBURN UNIVERSITY

Project: ______________________ **Project Number:** ______________________

Location ______________________ **P.O. #** ______________________

Contractor: ______________________ **Address:** ______________________

Architect: ______________________ **Address:** ______________________

Pay Request Estimate No: ______________________ **Date:** ______________________

Item No.	Description	Original Estimate	Percentage Complete	Amount Complete
DETAILED				
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
	TOTAL ORIGINAL CONTRACT	$0.00	#DIV/0!	$0.00
	NET TOTAL OF CHANGE ORDERS			$0.00
	TOTAL CONTRACT TO DATE	$0.00	#DIV/0!	$0.00

Change Order Recap:

No.	Description	(+ or -)Value	% Complete	**Value Complete**
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00

NET AMOUNT OF CHANGE ORDERS:	**$0.00**
REVISED CONTRACT AMOUNT:	**$0.00**
VALUE OF WORK IN PLACE:	**$0.00**
ADD STORED MATERIALS (FROM ATTACHED LIST)	**$0.00**
SUBTOTAL FOR RETAINAGE CALCULATION	**$0.00**
LESS RETAINAGE (calculation based on subtotal above) ***Refer to General Conditions, Article 29E***	
TOTAL DUE TO CONTRACTOR	**$0.00**
LESS PREVIOUS PAYMENTS TO CONTRACTOR	
BALANCE DUE THIS ESTIMATE	**$0.00**

Notary Seal Required:

I Certify that all amounts have been paid for Work for which previous Certificates for Payments were issued and payments received from the Owner, and, that the above account is correct, just, and that payment therefore has not yet been received.

Sworn to and subscribed before me this day of _____, _____.

_____
Contractor's Signature

Notary Public _____

_____
Print Contractor Name/Title

Checked and Approved by: _____ ***Dated:*** _____
Architect's Signature

Approved by AU Representative _____ ***Dated:*** _____

STORED MATERIAL LIST

AU Form C-10SM
November 2015

Pay Request Estimate No: _____

Project Name: _____

Project No. _____

Purchase Order No. _____

Contractor's Name _____

DESCRIPTION	Previous Invoices	Invoices this Month	Amount Used	Stored Material
General Requirements				
Sitework				
Concrete				
Masonry				
Metals				
Carpentry				
Roofing & Waterproofing				
Doors & Windows				
Finishes				
Specialities				
Equipment				
Furnishings				
Special Construction				
Conveying Systems				
Mechanical				
Electrical				
Subtotal				

Total Stored Material	

PROGRESS SCHEDULE AND REPORT		
PROJECT:	CONTRACTOR:	DATE OF REPORT:
B.C. No.:	ARCHITECT:	PROCEED DATE:
		PROJECTED COMPLETION DATE:

WORK DIVISION	%	AMOUNT													
1. GENERAL REQUIREMENTS															
2. SITEWORK															
3. CONCRETE															
4. MASONRY															
5. METALS															
6. WOOD AND PLASTIC															100%
7. THERMAL AND MOISTURE PROTECTION															90%
8. DOORS AND WINDOWS															80%
9. FINISHES															70%
10. SPECIALTIES															60%
11. EQUIPMENT															50%
12. FURNISHINGS															40%
13. SPECIAL CONSTRUCTION															30%
14. CONVEYING SYSTEMS															20%
15. MECHANICAL															10%
16. ELECTRICAL															0%
TOTAL ORIG. CONTRACT	100%														
ANTICIPATED DRAW IN $1,000															
ACTUAL DRAW IN $1,000															

USE ADDITIONAL SHEETS IF JOB IS SCHEDULED MORE THAN 12 MONTHS

LEGEND:

ANTICIPATED ACTIVITY ACTUAL ACTIVITY ANTICIPATED CASH FLOW ACTUAL CASH FLOW

AU Form C-10PRL
November 2015

Partial Release of Lien

STATE OF ALABAMA SUBJECT: _____

_____ COUNTY MATERIAL FURNISHED: _____

We, _____ do hereby and herewith through

_____, _____
(Name of person signing affidavit) (Title)

declare that all labor, bills for materials for supplies, utilities and for all other things furnished or caused to be furnished by the above between

_____, _____
(Name of firm) (Name of contractor)

have been fully paid, that there are no unpaid claims or demands of Subcontractors, material, men, mechanics, laborers or others resulting from or arising out of any work done or ordered to be done by said subcontractor under the above identified contracts, and declares that the Federal and State payroll taxes and contributions for unemployment insurance, old age pensions, annuities and retirement benefits imposed or assessed under any provision of any law, State or Federal, and measured by wages, salaries or other remuneration paid by said subcontractor to employees of his own Subcontractors engaged in said work or in any operation incidental thereto, have been paid.

NOW THEREFORE, KNOW YE, that we, the undersigned, do hereby waive and release any and all lien on said above described building and premises, arising under any by virtue of the General Labor and Mechanics Lien on account of Labor or materials or both, furnished or this may hereafter be furnished by the undersigned to or on account of the said

_____
(Name of contractor)

for said building or premises.

Subscribed and sworn to me _____
(Name of contractor)

On this _____ day of _____, _____ _____

_____

NOTARY PUBLIC
My commission expires: _____ (Seal)

CONTRACT CHANGE ORDER

Change Order No. _____ **Date** _____ **B.C.No.** _____

TO: (*Contractor*)	**PROJECT:**

TERMS: You are hereby authorized, subject to the provisions of your Contract for this project, to make the following changes thereto in accordance with your proposal(s) dated

_____

FURNISH the necessary labor, materials, and equipment to (*Description of work to be done or changes to be made.*)

ORIGINAL CONTRACT SUM	**$**		**ORIGINAL SUBSTANTIAL COMPLETION DATE**	
NET TOTAL PREVIOUS CHANGE ORDERS	**$**		**ORIGINAL CONTACT DURATION**	
PREVIOUS REVISED CONTRACT SUM	**$**		**NET TOTAL DAYS FOR PREVIOUS CHANGE ORDERS**	
THIS CHANGE ORDER WILL ___ INCREASE ___ DECREASE THE CONTRACT SUM BY	**$**		**THIS CHANGE ORDER WILL ___ INCREASE ___ DECREASE CONTRACT DURATION BY**	
REVISED CONTRACT SUM, INCLUDING THIS CHANGE ORDER	**$**		**REVISED CONTRACT DURATION, INCLUDING THIS CHANGE ORDER**	
			REVISED SUBSTANTIAL COMPLETION DATE, INCLUDING THIS CHANGE ORDER	

The Owner does hereby certify that this Change Order was executed in accordance with the provisions of Title 39, Code of Alabama, 1975, as amended.

CONSENT OF SURETY

_____
(Company)

By _____
(Attach current Power of Attorney)

RECOMMENDED

By _____
Architect

APPROVALS
STATE OF ALABAMA BUILDING COMMISSION
(Not required for locally-funded SDE projects)

By _____
Director, Technical Staff

CONTRACTING PARTIES

_____
Contractor

By _____
Name & Title_____

Auburn University
(Awarding Authority)

By _____
Name & Title: President

ABC Form B-11
August 2001

CHANGE ORDER JUSTIFICATION

TO: **STATE OF ALABAMA**
BUILDING COMMISSION
770 Washington Avenue, Suite 444
Montgomery, Alabama 36130
(334) 242-4082 FAX (334) 242-4182

Change Order No. _____
Date: _____

***PURPOSE** AND **INSTRUCTIONS** ON REVERSE SIDE*

B.C. No. _____

(A)

PROJECT:	OWNER: Auburn University c/o Facilities Management Building Two 1161 W. Samford Avenue Auburn University, AL 36849
CONTRACTOR:	ARCHITECT/ENGINEER:

(B) **DESCRIPTION OF PROPOSED CHANGE(S):** **ATTACH CONTRACTOR'S DETAILED COST PROPOSAL(s)**

AMOUNT: ☐ **ADD** ☐ **DEDUCT $**_____ **TIME EXTENSION:** _____ **CALENDAR DAYS**

(C)

ORIGINAL. CONTRACT	PREVIOUS C.O.'s _____ THRU _____	CURRENT CONTRACT
$_____	$_____	$_____

(D) **JUSTIFICATION FOR NEED OF CHANGE(S):**

(E) **JUSTIFICATION OF CHANGE ORDER vs. COMPETITIVE BID:**

(F) **ARCHITECT/ENGINEER'S EVALUATION OF PROPOSED COST:**

(G)

CHANGE ORDER RECOMMENDED	CHANGE ORDER JUSTIFIED AND APPROVED
_____ NAME OF ARCHITECTURAL/ENGINEERING FIRM	Auburn University LOCAL OWNER
By: _____ ARCHITECT/ENGINEER	By: _____ President
By: _____ OWNER'S PROJECT REPRESENTATIVE	By: _____ OWNER'S LEGAL COUNSEL

CHANGE ORDER JUSTIFICATION: PURPOSE and INSTRUCTIONS

PURPOSE

The awarding of work through an existing contract may potentially conflict with, or violate, the "Competitive Bid Laws" of the State of Alabama. **The determination of legality of Change Orders rests with the Awarding Authority and its legal advisor.** In a June 15, 1979, Opinion, the Office of the Attorney General offered guidelines for making such determinations in conjunction with considering the facts and merits of each situation. The purpose of the CHANGE ORDER JUSTIFICATION is to provide a means through which the Awarding Authority considers these guidelines and the intent of the "Competitive Bid Laws" when authorizing Change Orders. Pursuant to these guidelines, the following types of changes meet the criteria for awarding work through Change Orders in lieu of through the Competitive Bid process:

I. Minor Changes for a monetary value less than required for competitive bidding.

II. Changes for matters relatively minor and incidental to the original contract necessitated by unforeseeable circumstances arising during the course of the work.

III. Emergencies arising during the course of the work of the contract.

IV. Bid alternates provided for in the original bidding where there is no difference in price of the change order from the original best bid on the alternate.

V. Changes of relatively minor items not contemplated when the plans and specifications were prepared and the project was bid which are in the public interest and which do not exceed 10% of the contract price.

Under these guidelines the cumulative total of Change Orders, including any negotiations to bring the original contract price within the funds available, would become questionable if the total of such changes and negotiations exceed 10% of the original contract price. These guidelines are not intended to interfere with the Awarding Authority's good faith discretion to respond to specific situations in the public's best interest.

INSTRUCTIONS

The CHANGE ORDER JUSTIFICATION is to be prepared by the design professional, who has evaluated the fairness and reasonableness of the proposed cost of the change(s) and recommends that the proposed Change Order be executed. The fully executed CHANGE ORDER JUSTIFICATION must accompany the proposed Change Order. Instructions for completing the form are:

1. Insert the proposed Change Order Number, date of the Justification, and BC Project Number in the spaces provided in the upper right-hand corner.

2. **Section (A):** Insert the complete name and address of the PROJECT, OWNER, CONTRACTOR, AND ARCHITECT/ENGINEER.

3. **Section (B)**: Provide a complete description of the proposed changes in work, referring to and attaching revised specifications and/or drawings as appropriate. An attachment may be used if additional space is needed, but insert the proposed amount and time extension of the change(s) in the spaces provided. **Attached a copy of the contractor's detailed cost proposal.**

4. **Section (C**): Insert the Original Contract amount, the net increase or decrease of previous Change Orders, and the Current Contract amount (preceding the currently proposed Change Order).

5. **Section (D):** Explain why it is necessary, or in the public's interest, to make the proposed change(s) to the Work.

6. **Section (E)**: Explain why award of the changed work to the existing contractor instead of awarding the work under the competitive bid process is justified.

7. **Section (F)**: The design professional must state his evaluation of the reasonableness and fairness of the proposed costs based upon his review of the contractor's proposal.

8. **Section (G)**: The design professional must recommend the Change Order to the Owner by signing the document; the Owner may require such recommendation from other individuals. The Owner must sign the document indicating that they believe change order action in lieu of the competitive bid process is justified for the proposed change(s). **Review of the matter and signing of the document by the Owner's legal counsel is highly recommended.**

Change Proposal Recap Sheet

Date: _____
Contractor Name: _____
Project Name: _____
AU Job Number : _____

Initiated By: (Check One) Owner/Architect ☐ Contractor ☐ Subcontractor ☐

Reference Change Proposal Request Number: _____

Brief Description of Proposed Change: _____

PRIME CONTRACTOR Direct Cost Summary

Item/Description *	Quantity	Unit	Amount Unit $	Material	Unit $	Labor	Unit $	Equipment
Sub Totals:				$0.00		$0.00		$0.00

Material:	$0.00
Labor:	$0.00
Equipment:	$0.00
Prime Contractor Subtotal:	$0.00

SUBCONTRACTOR Direct Cost Summary

Added Area Of Slab on Grade	Quantity	Unit	Amount Unit $	Material	Unit $	Labor	Unit $	Equipment	Unit $	Sub-sub
Sub Totals:				$0.00		$0		$0		$0

Material:	$0.00
Labor:	$0.00
Equipment:	$0.00
Sub-sub	$0.00
Subcontractors Subtotal:	$0.00

Mark-up Calculations

Subcontractors Subtotal:	$0.00	
Prime Cntrtr Subtotal:	$0.00	
Total Direct Cost:	$0.00	
Prime OH&P on Own Work:	$0.00	15%
Total OH&P on Sub Work:	$0.00	25%

Total Cost Change _____ **$0.00** (Add / Deduct)

Total Time Change _____ Calendar Days (Critical path impacts only)

* Materials permanently installed in the building shall be sales tax free.

* Any requests for additional time are only considered if the critical path of the project is extended. Attach additional pages with explanation of how the change affects the critical path of the project.

Auburn University
Construction Change Directive (C.C.D.)

PROJECT:

DIRECTIVE NUMBER:
DATE:
TYPE OF WORK:
CONTRACT DATE:

CONTRACTOR:

You are hereby directed to make the following change(s) in the work:
(Describe briefly any proposed changes or list any attached information in the alternative)

PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum will be:
   - ☐ Lump Sum increase/decrease of:
   - ☐ Unit Price of:
   - ☐ Force Account as provided in Article 19 of ABC Form C-8 (August 2001) and not to exceed $_____
     See attached "Force Account CCD Documentation Requirements" for documentation guidelines.
   - ☐ Force Account as provided in Article 19 of ABC Form C-8 (August 2001)
     See attached "Force Account CCD Documentation Requirements" for documentation guidelines.
   - ☐ Or as follows:
2. The Contract Time:
   - ☐ Will be increased/decreased by (_) _____ calendar days
   - ☐ Will be determined at a later date

When signed by the Owner and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

This C.C.D. will be included in Change Order to your Contract.

Approved for Signature

by: _____ Date: _____
Project Manager

Auburn University

by: _____ Date: _____

c: Architect
Project File

November 2015

Force Account CCD Documentation Requirements

Signed Daily Work Ticket

1 Verified and signed daily by authorized AU representative (named in this document). To be signed no later than noon of the following day work is performed.

2 Includes following Information:

A. Description of tasks performed B. Identify Employees working that day

C. Identify # of hours worked by each employee

D. Identify material purchased/used including quantity(provide dray or delivery ticket or invoice copy)

E. Identify equipment used (provide dray or rental ticket or invoice copy)

F. Identify any agreed upon miscellaneous costs incurred along with proper documentation.

G. Provide same documentation for Subcontractors

Force Account CCD Recap Requirements

1 Recap of cost; broken down by Labor, Material, Equipment, Subcontract; totalled with acceptable labor burden and acceptable contractor markups.

2 Signed daily work tickets

3 Supporting documents

A. Document to verify actual # of hours worked and actual rate of pay for each employee B. Material Invoices

C. Equipment rental invoice

D. Owned Equipment documentation with supporting rates not to exceed local prevailing rental rates.

E. Miscellaneous cost documentation

F. Subcontractor documentation of cost (same as GC requirements)

GENERAL CONTRACTOR'S ROOFING GUARANTEE

B. C. Project No. _____

_____

Project Name & Address	Project Owner(s) & Address

General Contractor's Name, Address, & Telephone Number	**EFFECTIVE DATES OF GUARANTEE**
	Date of Acceptance:
	Date of Expiration:

1. The General Contractor does hereby certify that the roofing work included in this contract was installed in strict accordance with all requirements of the plans and specifications and in accordance with approved roofing manufacturers recommendations.

2. The General Contractor does hereby guarantee the roofing and associated work including but not limited to all flashing and counter flashing both composition and metal, roof decking and/or sheathing; all materials used as a roof substrate or insulation over which roof is applied; promenade decks or any other work on the surface of the roof; metal work; gravel stops and roof expansion joints to be absolutely watertight and free from all leaks, due to faulty or defective materials and workmanship for a period of five (5) years, starting on the date of substantial completion of the project. This guarantee does not include liability for damage to interior contents of building due to roof leaks, nor does it extend to any deficiency which was caused by the failure of work which the general contractor did not damage or did not accomplish or was not charged to accomplish.

3. Subject to the terms and conditions listed below, the General Contractor also guarantees that during the Guarantee Period he will, at his own cost and expense, make or cause to be made such repairs to, or replacements of said work, in accordance with the roofing manufacturers standards as are necessary to correct faulty and defective work and/or materials which may develop in the work including, but not limited to: blisters, delamination, exposed felts, ridges, wrinkles, splits, warped insulation and/or loose flashings, etc. in a manner pursuant to the total anticipated life of the roofing system and the best standards applicable to the particular roof type in value and in accordance with construction documents as are necessary to maintain said work in satisfactory condition, and further, to respond on or within three (3) calendar days upon proper notification or leaks or defects by the Owner or Architect.

A. Specifically excluded from this Guarantee are damages to the work, other parts of the building and building contents caused by: (1) lightning, windstorm, hailstorm and other unusual phenomena of the elements; and (2) fire. When the work has been damaged by any of the foregoing causes, the Guarantee shall be null and void until such damage has been repaired by the General Contractor, and until the cost and expense thereof has been paid by the Owner or by the responsible party so designated.

B. During the Guarantee Period, if the Owner allows alteration of the work by anyone other than the General Contractor, including cutting, patching and maintenance in connection with penetrations, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the owner engages the General Contractor to perform said alterations, the Guarantee shall not become null and void, unless the General Contractor, prior to proceeding with the said work, shall have notified the Owner in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the work, thereby reasonably justifying a termination of this Guarantee.

C. Future building additions will not void this guarantee, except for that portion of the future addition that might affect the work under this contract at the point of connection of the roof areas, and any damage caused by such addition. If this contract is for roofing of an addition to an existing building, then this guarantee covers the work involved at the point of connection with the existing roof.

D. During the Guarantee period, if the original use of the roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

E. The Owner shall promptly notify the General Contractor of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such leaks, defects or deterioration.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20 _____.

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

ABC Form C-13
August 2001

TO: **STATE OF ALABAMA**
BUILDING COMMISSION
770 Washington Avenue, Suite 444
Montgomery, AL 36130-1150
(334) 242-4082 FAX (334) 242-4182

CERTIFICATE OF SUBSTANTIAL COMPLETION

ROUTING PROCEDURES *ON REVERSE SIDE*

BC# _____

OWNER(S):	**ARCHITECT:**
CONTRACTOR:	**BONDING COMPANY:**
PROJECT	

Substantial Completion has been achieved for ☐ the entire Work ☐ the following portion of the Work _____

_____

_____.

The **Date of Substantial Completion** of the Work covered by this certificate is established to be _____.

"Substantial Completion" means the designated Work is sufficiently complete, in accordance with the Contract Documents, such that the Owner may occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work. The Date of Substantial Completion is the date upon which all warranties for the designated Work commence, unless otherwise agreed and recorded herein.

Punch List: A _____ page list of items to be completed or corrected prior to the Owner's approval of Final Payment is attached hereto, but does not alter the Contractor's responsibility to complete or correct all Work in full compliance with the Contract Documents. The Contractor shall complete or correct all items on the attached list, ready for re-inspection for Final Acceptance, within 30 days after the above Date of Substantial Completion, unless another date is stated here: _____.
If completed or corrected within this period, warranties of these items commence on the Date of Substantial Completion, otherwise such warranties commence on the date of Final Acceptance of each item.

Only <u>one</u> (1) originally executed substantial completion form should be routed for signature. B.C. office will forward the original to the Owner and provide copies to all other parties.

RECOMMENDED BY:	
ARCHITECT: _____	DATE: _____
CONTRACTING PARTIES:	
CONTRACTOR _____	DATE: _____
OWNER _____	DATE: _____
_____	DATE: _____
APPROVALS:	DATE: _____
BUILDING COMM.INSPECTOR: _____	DATE: _____
BUILDING COMM. CHIEF INSPECTOR: _____	DATE: _____
BUILDING COMM. DIRECTOR: _____	

CERTIFICATE OF SUBSTANTIAL COMPLETION ROUTING PROCEDURE

Only <u>one</u> (1) originally executed substantial completion form should be routed for signature. B.C. office will forward the original to the owner and provide copies to all other parties.

ARCHITECT/ENGINEER: Please forward to Contractor after signature and date. <u>Please provide Owner with local B.C. Inspector's name & home address.</u>

CONTRACTOR: Please forward to Owner after signature and date.

OWNER: Please forward to local B.C. Inspector's <u>home address</u> after signature and date. You may contact B.C. office at (334) 242-4082 if B.C. Inspector's name/address is needed.

B.C. INSPECTOR: Will forward document to B.C. office for review and distribution.

NOTICE

THE EXECUTED "GENERAL CONTRACTOR'S ROOFING GUARANTEE" (ABC Form C-9) AND ANY OTHER ROOFING WARRANTY REQUIRED BY THE CONTRACT MUST ACCOMPANY THIS CERTIFICATE TO OBTAIN ABC APPROVAL.

ABC Form C-14
August 2001

FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, notice is hereby given that _____,
(Contractor)
Contractor, has completed the Contract for (Construction) (Renovation) (Alteration) (Equipment) (Improvement) of *(Name of Project)*

at _____

(Insert location data in County or City)
for the State of Alabama and the (County) (City) of _____,Owner(s), and have made request for final settlement of said Contract. All persons having any claim for labor, materials, or otherwise in connection with this project should immediately notify

_____
_____*(Architect)*

_____
(Contractor)

_____
(Business Address)

NOTE: This notice must be run once a week for four successive weeks for projects exceeding $50,000.00, for projects of less than $50,000.00, run one time only. Proof of publication is required.

AU Form C-10FRL
November 2015

Final Release of Lien

STATE OF ALABAMA SUBJECT: _____

_____ COUNTY MATERIAL FURNISHED: _____

We, _____ do hereby and herewith through

_____, _____
(Name of person signing affidavit) (Title)

declare that all labor, bills for materials for supplies, utilities and for all other things furnished or caused to be furnished by the above between

_____, _____
(Name of firm) (Name of contractor)

have been fully paid, that there are no unpaid claims or demands of Subcontractors, material, men, mechanics, laborers or others resulting from or arising out of any work done or ordered to be done by said subcontractor under the above identified contracts, and declares that the Federal and State payroll taxes and contributions for unemployment insurance, old age pensions, annuities and retirement benefits imposed or assessed under any provision of any law, State or Federal, and measured by wages, salaries or other remuneration paid by said subcontractor to employees of his own Subcontractors engaged in said work or in any operation incidental thereto, have been paid.

NOW THEREFORE, KNOW YE, that we, the undersigned, do hereby waive and release any and all lien on said above described building and premises, arising under any by virtue of the General Labor and Mechanics Lien on account of Labor or materials or both, furnished or this may hereafter be furnished by the undersigned to or on account of the said

_____
(Name of contractor)

for said building or premises.

Subscribed and sworn to me _____
(Name of contractor)

On this _____ day of _____, _____ _____

_____

NOTARY PUBLIC
My commission expires: _____ (Seal)

APA-3
07/04

CERTIFICATION OF ADMINISTRATIVE RULES
FILED WITH THE LEGISLATIVE REFERENCE SERVICE
JERRY L. BASSETT, DIRECTOR

(Pursuant to Code of Alabama 1975, §41-22-6, as amended).

I certify that the attached is/are correct copy/copies of rule/s as promulgated and adopted on the 7th day of August, 2014, and filed with the agency secretary on the 7th day of August, 2014.

AGENCY NAME: ALABAMA BUILDING COMMISSION

_____Amendment __X__ New _____Repeal (Mark appropriate space)

Rule No. 170X-8
(If amended rule, give specific paragraph, subparagraphs, etc., being amended)

Rule Title: Collection of User Fees

ACTION TAKEN: State whether the rule was adopted with or without changes from the proposal due to written or oral comments:

The chapter is adopted without changes from the proposal due to written comments. The comments received did not propose any change to the proposed rule. One minor grammatical correction was made.

NOTICE OF INTENDED ACTION PUBLISHED IN VOLUME XXXII, ISSUE NO. 8, AAM, DATED MAY 30, 2014.

Statutory Rulemaking Authority: Code of Alabama 1975, §41-9-141 and 142.

(Date Filed)
(For LRS Use Only)

Katherine Lynn
Certifying Officer or his or her Deputy

(NOTE: In accordance with §41-22-6(b), as amended, a proposed rule is required to be certified within 90 days after completion of the notice.

STATE OF ALABAMA BUILDING COMMISSION
CHAPTER 170X - 8
COLLECTION OF USER FEES

170-X-8-.01 APPLICABILITY

The following procedures and user fees are applicable to new construction, additions or alteration projects for buildings under the jurisdiction of the Alabama Building Commission as defined by the Code of Alabama, Title 41, Section 41-9-162 and authorized by Sections 41-9-141(a) (8) and 41-9-142 (b). These rules apply to projects having the first or final project submittal received for review by the Building Commission on or after October 1, 2014 and projects bid after October 1, 2014. Projects reviewed prior to October 1, 2014 but bid after October 1, 2014 shall only be required to pay the permit fee. The contract document administration fee shall apply to contract documents requiring the Building Commission's approval submitted for approval after October 1, 2014.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8), 41-9-142(b)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.02 CALCULATION OF FEES

Total Valuation	Plan Review Fee	Permit Fee
Less than $1000	No fee.	No fee, unless inspection required, in which case a $15.00 fee for each inspection shall be charged.
$1,001 to $50,000	One-half of the permit fee which is $15.00 for the first $1,000.00 plus $5.00 for each additional thousand or fraction thereof, to and including $50,000.00.	$15.00 for the first $1,000.00 plus $5.00 for each additional thousand or fraction thereof, to and including $50,000.00.
$50,001 to $100,000	One-half of the permit fee which is $260.00 for the first $50,000.00 plus $4.00 or each additional thousand or fraction thereof, to and including $100,000.00.	$260.00 for the first $50,000.00 plus $4.00 or each additional thousand or fraction thereof, to and including $100,000.00.

$100,001 to $500,000	One-half of the permit fee which is $460.00 for the first $100,000.00 plus $3.00 for each additional thousand or fraction thereof, to and including $500,000.00.	$460.00 for the first $100,000.00 plus $3.00 for each additional thousand or fraction thereof, to and including $500,000.00.
$500,001 and up	One-half of the permit fee which is $1,660.00 for the first $500,000.00 plus $2.00 for each additional thousand or fraction thereof.	$1,660.00 for the first $500,000.00 plus $2.00 for each additional thousand or fraction thereof.

The total valuation of work shall be the cost of construction. The "cost of construction" shall include the cost of the actual building construction, addition, or alteration work, including sitework.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.03 FEES REQUIRED

(1) Initial Fee: The first submittal of each new project shall be accompanied by ½ of the plan review fee not to exceed $500.00. Submittals sent in without this initial fee will not be reviewed until the fee payment is received.

(2) Final Submittal Approval Fee: The final submittal of each project shall be accompanied by a payment for the balance of the total plan review fee payment. Submittals sent in without this final submittal fee will not be reviewed until the fee payment is received. The following conditions apply:

a. Written review comments must be sent by the Building Commission to the architect within 30 calendar days of receipt of the submittal. If the submittal is not reviewed within this time limitation, the Final Submittal Approval Fee is waived.

(3) Permit Fee: Upon approval of the construction contract and prior to scheduling the Pre-Construction conference to be performed by the Building Commission Inspector, payment shall be due immediately for the total permit fee. The following conditions apply:

a. The Pre-Construction conference will not be performed prior to receipt of the Permit Fee.

(4) Reviews and Inspections Covered by Fees: The Final Submittal Approval Fee shall include review of schematic, preliminary, final and one revised final submittals. The Permit Fee shall include the following building inspections: Pre-Construction Conference, Pre-Roofing Conference, Above-Ceiling Inspection, Final Inspection and Year-End Inspection. Additional required inspections such as fire alarm inspections, kitchen hood inspections, elevator inspections and other such inspections shall be included as part of the Permit Fee.

(5) Additional Fees:

a. If more than one revised final submittal is required, an additional fee shall be required for each additional revised final submittal. The additional fee shall be equal to the lesser of the following: 15% of the total fee or $2000. The time

restrictions and conditions which apply to routine submittals shall apply to additional submittals.

b. If the contractor schedules an inspection and it is determined by the Building Commission Inspector on site that the contractor is not ready for the scheduled inspection, the Building Commission shall require an additional fee of $1500. The additional inspection fee shall be applied to each additional inspection that is required to be rescheduled.

c. If additional drawings for change orders or addendum are submitted after approval as part of a larger project, the additional fees shall be assessed at the completion of the contract based on the actual construction contract cost.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.04 PAYMENT OF FEES

(1) Final Submittal Approval Fee payment shall be accompanied by the "Final Submittal Approval Fee Worksheet" and a copy of the architect's latest estimated cost of building construction. The cost estimate shall be the basis for calculating the estimated total fee on the fee worksheet.

(2) Permit Fee payment shall be accompanied by the completed "Permit Fee Worksheet" and a copy of the executed construction contract. The construction contract shall be the basis for calculating the total fee on the fee worksheet.

(3) Fee payments are nonrefundable.

(4) Fee payments shall be by check or money order made payable to the "Alabama Building Commission".

(5) Fee payments shall be received only at the Alabama Building Commission's office in Montgomery.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.05 FINAL COST OF THE WORK

The final cost of the work for the permit fee shall be adjusted for change orders and for sales tax credit received by the Owner. The final cost of the work for plan review fees shall be adjusted to include the lowest bid on additive unawarded alternates. The final adjustment along with a copy of the contractor's final pay request shall be submitted to the Building Commission with the Certificate of Substantial Completion.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.06 PENALTIES

Where work for which Building Commission approval is required is started or proceeds prior to obtaining said approval, the fees herein specified shall be doubled, but the payment of such double fee shall not relieve any persons from fully complying with the requirements of the Building Commission in the execution of the work nor from any other penalties prescribed herein.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

170-X-8-.07 CONTRACT DOCUMENT ADMINISTRATION FEES

For projects requiring the Building Commission's approval of the contract documents, a contract document administration fee equal to 1/2% of the construction cost will be charged to the Owner.

Author: Katherine Lynn
Statutory Authority: Code of Alabama 1975, 41-9-141 (a)(8)
History: Filed May 20, 2014; Certified August 7, 2014; Effective October 1, 2014.

CODE OF ALABAMA 1975, Sections 41-9-140 through 41-9-142

Section 41-9-140

Creation; composition; election and filling of vacancies of legislative members; officers; compensation and expenses of members; meetings generally.

There is hereby created a building commission, to be known as the Building Commission, the membership of which shall consist of the Governor, the State Health Officer, the Director of Finance, the State Superintendent of Education, four members from the Senate to be elected by that body at each regular session of the Legislature and four members from the House of Representatives to be elected by that body at each regular session of the Legislature. In the event of a vacancy on the commission caused by the death or resignation of a member elected by the Senate, such vacancy shall be filled by election by the commission at the next regular meeting, such member to be elected from the membership of the Senate. In the event of a vacancy on the commission caused by the death or resignation of a member elected by the House of Representatives, such vacancy shall be filled by election by the commission at its next regular meeting, such member to be elected from the membership of the House.

The Governor shall be chairman of the commission, and the Budget Officer of the state Department of Finance shall be the secretary thereof, but he shall not be a member. The secretary shall be custodian of its books, records and papers which he shall keep at the office of the commission to be provided at the seat of government.

All members of said commission shall serve without compensation. The legislative members shall receive reimbursement for their expenses when actively engaged on the commission's business, such expenses to be paid in accordance with Article 2 of Chapter 7 of Title 36 of this Code.

Said commission shall convene upon the call of the Governor or at such other time or times as the commission shall designate by a resolution spread upon its minutes.

(Acts 1945, No. 128, p. 116, §1; Acts 1951, No. 356, p. 644, §1.)

Section 41-9-141

Powers and duties generally; appointment, etc., of officers, employees and agents; adoption of rules, regulations and plans; approval and allocation of funds; notice of meetings required.

(a) The commission shall have full power and authority for, and on behalf of, the State of Alabama to do any or all of the following:

(1) To acquire lands by purchase, condemnation, or otherwise.

(2) To plan buildings and designate the location thereof.

(3) To plan and provide for the improvement of all property now owned or hereafter acquired by the state or any institution or agency thereof.

(4) To construct, repair, equip, remodel, enlarge, renovate, furnish, refurnish, improve, and locate buildings, structures, and facilities for the use of the State of Alabama or any of its institutions or agencies as in its judgment shall be necessary for state, institutional, or agency purposes.

(5) To enter into contract to perform any of the functions provided for in this subsection.

(6) To receive any moneys, land, or equipment donated, appropriated, or otherwise acquired by it for the purposes provided for in this subsection.

(7) To take the action necessary to accomplish the purposes provided for in this subsection.

(8) To charge and provide for collection of user fees for its services. The fees established shall take into consideration the costs of operating the commission. It is provided, however, that the fees so established by this section shall not exceed the Appendix B Recommended Schedule of Permit Fees of the Southern Standard Building Code.

(b) The commission is authorized and empowered to use the services, facilities, or employees of the Alabama Development Office in furthering the objects of this article when its request so to do is approved by the Governor.

(c) The commission may appoint and dismiss any officers, employees, and agents including competent architectural and technical employees as may be necessary to effectuate the purposes of this article. All employees of the commission shall be subject to the provisions of the Merit System. The commission is authorized to fix by contract the fees or compensation of all architectural and technical employees without regard to the Merit System Act.

(d) The commission is authorized and empowered to make and adopt all necessary rules, regulations, and plans for its own guidance and for the proper conduct of the duties imposed upon it.

(e) The decisions of the commission with respect to approval and allocations of funds shall be final.

(f) No meeting of the commission shall be held on less than three days' actual notice to the members thereof.

(Acts 1945, No. 128, p. 116, §2; Acts 1993, No. 93-344, p. 533, §1.)

Section 41-9-142

Commission user fees to be deposited into revenue fund; permissible disbursements; limitations on uses; when commission may begin to charge.

(a) All user fees collected by the commission under Section 41-9-141 shall be deposited into the existing special revenue fund in the State Treasury designated as the Building Commission Operating Fund. The Director of the Technical Staff of the Building Commission may make deposits to the fund and expenditures from the fund to carry out the functions of the commission. The receipts shall be disbursed only by warrant of the State Comptroller upon itemized vouchers initiated by the Director of the Technical Staff of the state Building Commission and approved by the Secretary of the state Building Commission. Notwithstanding the foregoing, no funds shall be withdrawn or expended for any purpose whatsoever unless the funds have been budgeted and allotted in accordance with Sections 41-4-80 to 41-4-96, inclusive, and 41-19-1 to 41-19-12, inclusive. The balance remaining in the fund at the end of a fiscal year shall carry over into the next fiscal year and shall not revert to the State General Fund or any other fund.

(b) The state Building Commission may start charging fees for services as authorized by Section 41-9-141 no sooner than the first day of the first month which follows the adoption date of a fee schedule promulgated under the Alabama Administrative Procedure Act.

(Acts 1993, No. 93-344, p. 533, §§2, 3.)

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ROBERT BENTLEY
Governor

Katherine Lynn
Director

October 28, 2013

TO: **STATE AGENCIES, K-12 SUPERINTENDENTS, COMMUNITY COLLEGES, UNIVERSITIES**

FROM: **KATHERINE LYNN, DIRECTOR**
ALABAMA BUILDING COMMISSION

SUBJECT: **ACT 2013-205, CERTIFICATE OF EXEMPTION FROM SALES AND USE TAX FOR GOVERNMENTAL ENTITIES**

Act 2013-205 was signed into law on May 9, 2013, granting the Alabama Department of Revenue (ADOR) the authority to issue certificates of exemption from sales and use taxes for construction projects for certain governmental agencies.

Summary

The full text of Act 2013-205 is available on the Building Commission's website at www.bc.alabama.gov. A brief summary of the Act is provided below:

- ADOR shall issue certificates of exemption from sales and use tax to governmental entities for each tax exempt project. Both the governmental entity and the contractor shall apply for certificates of exemption.
- Certificates of exemption shall only be issued for contracts entered into (awarded) on or after Jan. 1, 2014.
- Certificates shall only be issued to contractors licensed by the State Licensing Board for General Contractors or any subcontractor working under the same contract.
- Items eligible for exemption from sales and use tax are building materials, construction materials and supplies and other tangible personal property that become part of the structure per the written construction contract.
- ADOR will handle the administration of certificates of exemption and the accounting of exempt purchases. ADOR will have the ability to levy fines and may bar the issuance or use of certificates of exemption upon determination of willful misuse by the contractor or a subcontractor.
- The contractor shall account for the tax savings on the bid form.

Bidding of Projects Before Jan. 1, 2014

Projects bid before Jan 1, 2014 but awarded on or after Jan. 1, 2014 are still eligible for sales tax exemption regardless of whether the project was bid with or without sales tax. For projects bid before Jan. 1, 2014, the bid documents must specify if the contractor's bid shall or shall not include sales tax.

For projects bid before Jan. 1, 2014, if the project is bid with sales tax and the contractor and subcontractors purchase the materials tax exempt, prior to project closeout the contractor shall submit to the governmental entity a copy of the report filed with the Alabama Department of Revenue showing all exempt purchases. The actual sales tax savings indicated on the report shall be deducted from the final contract amount.

For projects bid after Jan. 1, 2014, the bid shall not include sales tax but the sales tax for the base bid and all bid items must be included on the contractor's bid proposal form. ABC Form C-3A indicates how the sales tax shall be accounted for on the bid proposal form and shall be modified by the project architect or engineer as appropriate for the bid items for each project. **Failure of the contractor to complete the attachment to the bid proposal form indicating the sales tax as required by Act 2013-205, Section 1 (g) shall render the bid non-responsive.**

Proposed Changes to Administrative Rules

Pursuant to Act 2013-205, the ADOR has proposed changes to the following administrative rules:

Rule 810-6-1-.46	Contractor's Liability
Rule 810-6-1-.46.01	Bleacher Systems, Lockers, Backstops, and Other Fixtures Installed in Gymnasiums
Rule 810-6-3-.77	Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities

A link to the proposed rules and information about the public hearings can be found on ADOR's website at http://www.revenue.alabama.gov/analysis/upcoming-rule-hearings.cfm . All interested parties may present their views in writing to the **Secretary of the Alabama Department of Revenue, Room 4131, Gordon Persons Building, 50 N Ripley Street, Montgomery, Alabama 36132** at any time during the thirty-five (35) day period following publication of the notice or by appearing at the hearing.

If you have any questions, please feel free to contact Katherine Lynn at the Alabama Building Commission at (334) 242-4082 or the Alabama Department of Revenue at (334) 242-1170.

cc: Ms. Julie Magee, Commissioner, Alabama Department of Revenue
Mr. Ben Albritton, Assistant Attorney General

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Robert Bentley
Governor

Katherine Lynn
Director

July 17, 2012

TO: **CONTRACTORS, ARCHITECTS AND ENGINEERS**

FROM: **KATHERINE LYNN, DIRECTOR**
ALABAMA BUILDING COMMISSION Katherine Lynn

SUBJECT: **MEMORANDUM ON ACT 2009-657 REQUIRING CERTIFICATION OF FIRE ALARM CONTRACTORS**

Act 2009-657, which was signed by Governor Riley on May 21, 2009, requires fire alarm contractors to be certified by and to obtain a permit from the State Fire Marshal. The act provided a 36-month grace period before requiring full compliance which expires on July 31, 2012.

In accordance with §34-33A-9, the local building official is required to receive a copy of the State Fire Marshal's permit before issuing a license or building permit. **Beginning August 1, 2012, the Building Commission will require the general contractor to furnish a copy of the fire alarm contractor's State Fire Marshal's Permit to the Building Commission Inspector at the Pre-Construction Conference.**

Beginning August 1, 2012, and pursuant to §34-33A-11(b), the Building Commission will require architects and engineers to obtain a copy of the fire alarm contractor's State Fire Marshal's Permit when the general contractor submits the list of subcontractors for the contract. The architect or engineer shall reject fire alarm contractors that cannot provide a copy of the required State Fire Marshal's Permit.

If you have any questions, please feel free to contact me at (334) 242-4082 or the State Fire Marshal, Ed Paulk, at (334) 241-4166.

cc: Mr. Ed Paulk, State Fire Marshal
Mr. Perry Taylor, State School Architect

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Robert Bentley
Governor

Katherine Lynn
Director

January 11, 2012

TO: **ARCHITECTS AND ENGINEERS**

FROM: **KATHERINE LYNN, DIRECTOR**
ALABAMA BUILDING COMMISSION

SUBJECT: **ADDITIONAL GUIDANCE ON ACT 2011-535 – ALABAMA IMMIGRATION LAW**

The Alabama Immigration Law (also referred to as "H.B. 56" or the "Beason-Hammon Alabama Taxpayer and Citizen Protection Act") imposes conditions on the award of State contracts. Those requirements are effective January 1, 2012 for any contract receiving state funds. Architects and engineers are advised to review and adhere to the guidelines as appropriate for their project type. The guidance for each department can be found on the following websites:

1. **Contracts for the State Department of Education (K-12 School Systems):** Information is posted under "Guidance for Compliance with E-Verify" on the Alabama State Department of Education's website at http://www.alsde.edu/home/Communications/E-VerifyInformation.aspx.

2. **Contracts for the Alabama Community College System:** Memorandum #2011-LGL-125 addresses Compliance with Alabama Immigration Law. A copy of the memorandum is posted on the Department of Postsecondary Education's website at http://www.accs.cc/Downloads/Memos/Memorandum-2011-LGL-125--12-29-11.pdf .

3. **Contracts for State Agencies:** The memorandum, "IMPORTANT ACTION REQUIRED-ALABAMA IMMIGRATION LAW - Compliance Guidelines for Sections 9(a) and 9(b) of Act 2011-535, Affecting Payments on Contracts, Grants and Incentives Awarded January 1, 2012, And Thereafter", is posted on the State Comptroller's website at http://comptroller.alabama.gov/pdfs/Memos/2012-01-06%20Alabama%20Immigration%20Law.pdf.

In general, any contract awarded after January 1, 2012 must include the contractor's affidavit of compliance with the Act and the E-Verify Memorandum of Understanding. The appropriate forms should be included in the bid package and the completed forms should be attached to the construction contracts. The appropriate forms are also required to be attached to the Agreement Between Owner and Architect. Architects (or engineers serving as the prime design consultant)

and general contractors are required to obtain the information from their consultants or subcontractors but should not submit the information with their contracts.

To aid in compliance with Act 2011-535, any contract received at the Building Commission after January 1, 2012 that does not include the appropriate affidavit and E-Verify Memorandum of Understanding will be returned.

The guidance for each department includes their points of contact for questions or you may contact me at (334) 242-4082.

Cc: Perry Taylor, State School Architect
Dr. Freida Hill, Chancellor of Postsecondary Education
Ms. Lynne Thrower, General Counsel/Vice Chancellor, Legal and Human Resources
Mr. Thomas White, Jr., State Comptroller
Ms. Pamela Harris, State Comptroller's Office

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Robert Bentley
Governor

Katherine Lynn
Director

May 29, 2012

TO: **ARCHITECTS AND ENGINEERS**

FROM: **KATHERINE LYNN, DIRECTOR**
ALABAMA BUILDING COMMISSION

SUBJECT: **GUIDANCE ON ACT 2012-491 AMENDING THE ALABAMA IMMIGRATION LAW**

The Alabama Immigration Law (also referred to as "Act 2011-535" and codified in state law as Title 31, Chapter 13 of the Code of Alabama 1975) was amended by Act No. 2012-491 which was signed by Governor Bentley on May 18, 2012. Upon signature, the following requirements went into effect:

1. Contractors (including architects and engineers) will no longer be required to provide an affidavit nor will they be required to obtain affidavits from their subcontractors or consultants.

2. Contractors (including architects and engineers) will still be required to enroll in the E-Verify program and to provide documentation of enrollment in the E-Verify program with their contracts or agreements.

3. All contracts and agreements must now include the following statement:

   By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the state of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

The departments that have previously issued guidance on compliance may revise their guidance based on Act No. 2012-491. Architects, engineers and contractors are urged to continue checking the websites for the State Department of Education, the Alabama Community College System and State Comptroller's Office for the latest information.

To aid in compliance, any contract received at the Building Commission after May 18, 2012 that does not include the required contract clause and E-Verify Memorandum of Understanding will be returned.

The websites for each department include their points of contact for questions or you may contact me at (334) 242-4082.

Cc: Mr. Perry Taylor, State School Architect
Ms. Lynne Thrower, General Counsel/Vice Chancellor, Legal and Human Resources
Mr. Thomas White, Jr., State Comptroller

Auburn University Supplemental Conditions

The following supplemental conditions modify the Alabama Building Commission (ABC) Construction Contract and Related Documents and provide Additional Auburn University Project Requirements.

I. Modifications to ABC Construction Contract and Related Documents

A. Definitions
   1. Reference to UPL (University Project Lead) is the same as University Project Manager.
      a) All projects have a UPL during both the design and construction phases.
      b) The Design UPL hands the project off to the Construction UPL at the NTP activity.
   2. Reference to ABC is the same as Alabama Building Commission.
   3. Reference to LOI is the same as Letter of Intent.
   4. Reference to NTP is the same as Notice to Proceed.
   5. Reference to SPW is the same as Small Public Works
   6. Reference to LPW is the same as Large Public Works

B. ABC C-1 Advertisement for Bid
   1. Replace ABC Form C-1 with AU Form C-1

C. ABC C-2 Instructions to Bidders
   1. Section 3: Qualifications of Bidders and Prequalification Procedures
      a) Insert the following behind C-2 document
         (1) For Non-BOT Projects use AU Form C-2a
         (2) For BOT Projects use AU Form C-2b
   2. Section 5: Examination of Bid Documents and the Site of the Work
      a) Insert the following as a 2nd paragraph: Requirement for Pre-bid Utilities Coordination: The bidders shall be solely responsible for contacting ALL local utility service agencies (University, private, public and/or municipal) PRIOR to bidding to determine the scope of modifications, if any, to all utilities on site of work or adjacent to site in right-of-ways or easements due to work scope of this project. Bidders should contact the University Project Lead (UPL) for information regarding those utilities owned by Auburn University.
   3. Section 8: Preparation and Delivery of Bids
      a) Add subsection: d. In addition to the proposal forms required in this section, Bidders shall include the following additional attachments with delivery of their bid:
         (1) ABC Form C-3A (Accounting of Sales Tax)
         (2) AU Form C-3C (Stated Allowances and Unit Prices)
         (3) AU Form C-3D (Certification of Compliance with Alabama Code Title 34, 39 & 41)
   4. Section 14: Consideration of Bids
      a) Add subsection: c. The apparent lowest responsible and responsive bidder shall submit the following post-bid submittals to the following email projsup@auburn.edu including both project number and name in the subject line:
         (1) AU Form C-3B – List of Subcontractors and Major Suppliers – 24 hours after Bid Opening
         (2) Schedule of Values – 24 hours after Bid Opening

(3) Approved Insurance Certificate – 2nd business day after Bid Opening.

(4) Complete Resume of proposed Superintendent and Project Manager - 5 calendar days

(5) Site Specific Safety Plan – 10 calendar days (see AU Form C-16, C-16A, C-16B)

D. ABC C-3: Proposal Form Additional Attachments

a) Add AU Form C-3C (Stated Allowances and Unit Prices). This MUST be attached to proposal form C-2 on Bid Day.

b) Add AU Form C-3D (Certification of Compliance with Alabama Code Title 34, 39 & 41). This MUST be attached to proposal form C-2 on Bid Day.

E. ABC C-5: Construction Contract Attachments

1. The following documents will be attached to ABC Form C-5: Construction Contract:

a) ABC Form C-6 Performance Bond

b) ABC Form C-7 Payment Bond

c) ABC Form C-8 General Conditions

d) ABC Form C-8S Supplement to the General Conditions of the Contract

e) ABC Form C-8 Attachment B

f) Certificate of Compliance with Act 2012-491, State Department of Finance

g) Attachment F of the Mandatory Safe Space, ACT 2012-554

h) Disclosure Statement *(Contract box should be checked)*

i) AU Form C-3B – List of Subcontractors and Major Suppliers

j) Insurance Certificate

k) Proposal Documents submitted on Bid Day

l) Specifications

m) Drawings

n) Modifications to the Construction Contract (applicable to PSCA Projects)

F. ABC C-8: General Conditions of the Contract

1. Article 1 Definitions

a) Subsection E. Contract

(1) Add item: 8. Proposal Documents submitted on Bid Day

(2) Add item: 9. Disclosure Statement (Contract box should be checked)

(3) Add item: 10. Alabama State Department of Finance Statement of Compliance with Act No. 2012-491

2. Article 4 Documents Furnished to Contractor

a) Replace in its entirety with: Contracts Documents, Drawings, Project Manuals, and Addenda will be furnished to the contractor by the Architect without charge in electronic format.

3. Article 12 Progress Schedule

a) Delete: "(Not applicable if the Contract Time is 60 days or less.)" located under Article title.

4. Article 14 Safety and Protection of Persons and Property

a) Add subsection: K. In addition to the safety requirements outlined in this article, please reference the following for additional safety requirements:

(1) AU Form C-16 Auburn University Safety Specifications

(2) AU Form C-16A Appendix A to Auburn University Safety Specifications

(3) AU Form C-16B Appendix B to Auburn University Safety Specifications

5. Article 19 Changes in the Work

a) Replace ABC Form C-12 with AU Form C-12 (previously approved by ABC on 1/26/15)

b) Section D Change Order Procedures

c) Subsection 4, Add item: e. The Owner will utilize the use of a Construction Change Directive (CCD) to authorize work prior to receipt of formal change order. The contractor will receive either AU Form C-12B or AU Form C-12C authorizing such work. All CCD's will be included in future change order. No billing will be allowed for CCD's until such time the CCD is incorporated into a formally executed change order.

d) Add subsection: 8. The Contractor shall submit all change proposals using the AU Form C-12A Change Proposal Recap Sheet

6. Article 23 Delays

a) Section B add subsection: 4. The process for granting time extensions due to inclement weather will be handle as follows:

(1) Obtain precipitation data from the A.W.I.S. Weather Service located at the Auburn Opelika Robert G. Pitts Airport code = AUO.

(2) A rain day is considered to be any day with a measured precipitation of more than 0.1 inch.

(3) Determine the average number of days per month with a measured precipitation of more than 0.1 inch for the five-year period preceding the start of the project in question.

(4) Compare the number of rain days during each month of the project contact time period to the monthly five-year average. The Contractor may be granted an extension for rain days during the contract period which exceeded the five year average. The number of days granted will vary for different types of projects, depending upon the amount of inside or outside work. Refer to the following classifications for various time extensions pertinent to typical project types. No time will be deducted from the contract period for months when rain days are less than the five-year average.

b) The following rain day classifications of projects and subsequent extensions for each rain day above the five-year average are listed below. See Section 01 1000 Project Summary for rain day classification identification for this project.

(1) Class I: Low Slope (1:12 or less) roof replacement on existing building – 2 days may be granted for each rain day beyond the five year average.

(2) Class II: Site work, paving underground utilities – 3 days may be granted for each rain day beyond the five year average.

(3) Class III: New Building and steep roof replacement (greater than 1:12) – 1 day may be granted for each rain day beyond the five year average.

(4) Class IV: Renovation of existing building with some outside work - .5 days may be granted for each rain day beyond the five year average.

(5) Class V: Renovation of existing building with no outside work – 0 days granted for each rain day beyond the five year average.

c) If time extensions are granted, they shall be included in the next subsequent change order.

d) Rain Day classification shall be Class III unless modified by Section 01 1000 Project Summary.

e) Reporting of rain days shall be included in each monthly schedule update.

7. Article 29 Progress Payments
   a) Replace ABC Form C-10 with AU Form C-10
   b) Replace ABC Form C-10SM with AU Form C-10SM
   c) Add AU Form C-10PRL, Partial Release of Lien
   d) Copy of Insurance and Bond for any material/equipment stored off site
8. Article 37 Contractor's and Subcontractors' Insurance
   a) Where the term "Owner" is used it shall be understood to include: "Auburn University including its Board of Trustees" and any Agents of the Owner.
   b) Part A General
      (1) Section 4 Insurance Certificates
         (a) Add item m: Sample copy of Insurance Certificate
   c) Part B Insurance Coverages:
      (1) Section 2 Commercial General Liability Insurance, subsection a, add the following:
         (a) Add item: .5 Contractual Liability $1,000,000.00
         (b) Add item: .6 Damage to Rented Premises $300,000.00
      (2) Section 5 Builder's Risk Insurance:
         (a) The Owner may elect to provide this coverage. See Project Summary (01 1000).
      (3) Add section: 6 Professional Liability Insurance:
         (a) Professional Liability/Errors and Omissions Liability will be required if the Contractor is acting as a licensed professional while performing a service for Auburn University. Licensed professionals include, but are not limited to: Architects, Engineers, and Professional Land Surveyors. Coverage should be provided as noted below:
            (i) Minimum Limit:
               (a) $1,000,000.00 Each Claim
               (b) $2,000,000.00 Annual Aggregate
         (b) Claims made policies must include a two year reporting period or coverage must be provided for up to two (2) years after the completion of a project.
      (4) Add Section: 7 Environmental Impairment Liability Insurance:
         (a) Environmental Impairment Liability Insurance will be provided if the contractor will be handling hazardous or toxic products. Contractors needing this coverage include, but is not limited to, transportation or disposal of explosives, nuclear materials, polychlorinated biphenyl (PCB) materials, pesticides , & fungicides, & oil; installation or removal of underground and above-ground storage tanks; asbestos abatement; and lead abatement.
            Minimum Limit $1,000,000 each claim $2,000,000 annual aggregate
         (b) Claims made policies must include a two year reporting period or coverage must be provided for up to two (2) years after the completion of a project.
   d) Add Part F Additional Conditions:
      (1) Impairment of Liability
         (a) In the event the insurance program required by Auburn University were to have any pending claim(s), which may limit or exhaust any aggregate limits by more than 20%,

Auburn University shall be notified within thirty (30) days. Auburn University may require additional insurance or reinstatement of the limits of liability as necessary to protect the financial interest of the University.

(2) Duty to Provide Copies of Insurance Policies

(a) Auburn University shall be entitled, upon request and without expense, to receive copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification or particular policy terms, conditions, limitations , or exclusions except where policy provisions are established by law or regulations binding upon either of the parties or to underwriting on such policies.

(3) Notice of Incident

(a) Contractor shall inform Auburn University Risk Management and Safety of all incidents and/or accidents that occur on the Auburn University premises or that might otherwise give rise to a claim against Auburn University and shall be responsible for providing appropriate written notification. Such notification shall be provided as soon as reasonably possible but will not exceed twenty- four (24) hours after contractor is aware of the incident/accident.

e) Include Project Supports' sample certificate of insurance

(1) SPW Version

(2) LPW Version

9. Article 51 Project Sign

a) Delete Architect in last sentence.

b) Replace ABC Form C-15 with AU Form C-15 or C-15CM.

c) On projects where CM Agent is being used, the project sign shall be per AU Form C-15CM.

G. ABC Form C-8S Supplement to the General Conditions of the Contract

1. Add page header that reads: "ABC Form C-8S, August 2009"

H. ABC Bulletins

1. Contractor shall be responsible for any requirements outlined in Administrative Rule 170-X-8 referenced in memo from Alabama Building Commission/Katherine Lynn dated September 29, 2014. See item 00 1500 'a' of the Table of Contents

2. Contractor shall be responsible for any requirements outlined Exemption from Sales and Use Tax, Act 2013-205 referenced in memo from Alabama Building Commission/Katherine Lynn dated October 28, 2013. See item 00 1500 'b' of the Table of Contents

3. Contractor shall be responsible for any requirements outlined Certification of Fire Alarm Contractors, referenced in memo from Alabama Building Commission/Katherine Lynn dated July 17, 2012. See item 00 1500 'c' of the Table of Contents

4. Contractor shall be responsible for any requirements outlined Mandatory Safe Space ACT 2012-554, referenced in memo from Alabama Building Commission/Katherine Lynn dated July 10, 2012. See item 00 1500 'd' of the Table of Contents

5. Contractor shall be responsible for any requirements outlined Additional Guidance Alabama Immigration Law ACT 2011-535, referenced in memo from Alabama Building Commission/Katherine Lynn dated January 11, 2012. See item 00 1500 'e' of the Table of Contents

6. Contractor shall be responsible for any requirements outlined Guidance Amending Alabama Immigration Law ACT 2012-491, referenced in memo from Alabama Building Commission/Katherine Lynn dated May 29, 2012. See item 00 1500 'f' of the Table of Contents

II. Additional Auburn University Project Requirements

A. Definitions

1. Reference to UPL (University Project Lead) is the same as University Project Manager.
   a) All projects have a UPL during both the design and construction phases.
   b) The Design UPL hands the project off to the Construction UPL at the NTP activity.
2. Reference to ABC is the same as Alabama Building Commission.
3. Reference to LOI is the same as Letter of Intent.
4. Reference to NTP is the same as Notice to Proceed.
5. Reference to SPW is the same as Small Public Works
6. Reference to LPW is the same as Large Public Works

B. Coordination with Owner Systems

1. The contractor is responsible for the complete fire alarm system. This would include all conduit, wiring, devices, programing, pre-testing, final testing, and certification of the complete fire alarm system. Once the contractor has completed their portion of the work, the University Project Lead (UPL) should be contacted to coordinate the download of the certified system to the University's network system. The contractor is not allowed to use the University's system administrator(s) to complete their work.
2. The contractor is responsible for the complete HVAC controls system. This would include all conduit, wiring, devices, programing, pre-testing, final testing, and certification of the complete HVAC system. The contractor is not allowed to use the University's system administrator(s) to complete their work.
3. The contractor is responsible for the complete access control system. This system must be installed by a certified LENEL installer. This would include all conduit, wiring, devices, programing, pre-testing, final testing, and certification of the complete access control system. Once the contractor has completed their portion of the work, the University Project Lead (UPL) should be contacted to coordinate the download of the certified system to the University's network system. The contractor is not allowed to use the University's system administrator(s) to complete their work. This does not mean that it has to be the same company with whom the Owner has a service agreement.
4. AU Access Control will install final lock cores provided by contractor. The lock cores will need to be coordinated sufficiently in advance of installation with the University Project Lead (UPL) to allow adequate time for fabrication and delivery. The UPL is responsible for submitting, to the Architect, a final keying schedule which has been vetted by the End User, Access Control, and UPL.
5. The contractor is responsible for the complete security camera system. This system must be installed by a certified Omni-Cast installer. This would include all conduit, wiring, devices, programing, pre-testing, final testing, and certification of the complete security camera system. Once the contractor has completed their portion of the work, the University Project Lead (UPL) should be contacted to coordinate the download of the certified system to the University's network system. The contractor is not allowed to use the University's system administrator(s) to complete their work. This does not mean that it has to be the same company with whom the Owner has a service agreement.
6. The contractor is responsible for the complete elevator/escalator system. The contractor is not allowed to

use the University's elevator service agreement technicians to perform any of the required scope of work.

C. General Requirements

1. All material staging for the project must occur within the fenced area or the contractor may elect to procure off-campus staging at their expense. The owner will not be responsible in any way for any off-campus storage the contractor may elect to procure. The contractor is required to have any off site storage of material/equipment insured and bonded prior to submitting any billing for stored material. Copies on both insurance and bond shall be attached to any and all billings of stored materials.
2. For interior renovation projects, a pre-bid meeting must be scheduled with UPL for both Design and Construction to discuss provisions for material staging.
3. There will not be any construction allowed on construction sites starting on Friday at noon through Sunday night of any home football game weekends. Any variance to this restriction must be approved by the UPL in writing by noon on Wednesday prior to game weekend. The UPL is required to obtain Facilities Management Leadership approval.
4. The Owner may be required to shut down construction sites for other reasons. When this becomes a requirement, the owner will give the contractor as much notice as possible and will meet with the contractor to discuss any cost incurred and resolve in a fair and reasonable manner.
5. No harassment ("cat-calling", whistling, staring, or any other inappropriate action(s) or behavior) will be tolerated toward any Auburn University Student, Faculty, Staff, campus visitors, etc. Anyone caught, or reported, in disobedience of this policy will be immediately and permanently dismissed from the project and will not be allowed to work on campus on any other current, or future projects.
6. All Auburn University construction projects are to adhere to all Auburn University policies on:
   a) Smoke-Free Campus *(including e-cigarettes)*
   b) Dangerous Weapons and Firearms
   c) Tree Preservation/Protection
7. Provide all temporary traffic control (including flagmen), traffic signage, barricades, and additional signage as required to complete the requirements of your scope. This includes the escorting of oversized loads on campus streets. Contractors must utilize the quickest route to get off campus as quickly as possible.
8. No music or radios are allowed on the project jobsite.
9. The contractor shall be responsible for coordinating all mapping of installed underground utilities with the UPL. Failure to coordinate this requirement will result in the contractor having to uncover any installed work to allow for proper mapping. Any cost incurred will be the responsibility of the contractor.
10. Contractor shall at all times maintain as-built documents and submit these as part of the project closeout phase.
11. The contractor is responsible for the as-built survey.
12. The contractor is prohibited from unauthorized flying of Unmanned Aircraft Systems (UAS) on the campus of Auburn University.
13. Contractor shall perform and complete a pre-punch list of the project prior to requesting the Architect and/or Owner perform their punch list.

D. Project Schedule

1. The contractor is responsible for the overall project schedule. Auburn University Facilities Management has implemented the use of MS Project 2013 as our scheduling software. The contractor shall schedule a meeting with the UPL to discuss project milestones required for the project. This must be approved by

Construction Management Leadership. The contractor can use any scheduling software they want as long as they meet the following criteria:

d) One column in the schedule must contain a 4 digit milestone number *("text 30")* as provided by Auburn University. A full list of milestones will be provided. For example, 5900 = Notice to Proceed

e) Ability to export schedule data to either MS Project 2013 or an XML file. Files will be submitted to the UPL for internal reporting purposes.

(1) The file (either MS Project 2013 or XML) should be named with the AU assigned project number (for example, 15-242) and must contain the following:

(a) Milestone Name and Number (i.e. 5900)

(i) Baseline Start

(ii) Baseline End

(iii) Estimated Start

(iv) Estimated End

(v) Actual Start

(vi) Actual End

2. Develop and implement recovery plans for work tracking behind schedule.
3. Incorporate and track AU Milestones provided by AU CPM
4. Track progress and update critical path schedule at a minimum frequency of every 2 weeks
5. Preserve the baseline schedule and track progress against baseline.
6. Track owner provided equipment, furnishings, required inspections, and owner approvals as the project dictates to ensure activities are in line with the schedule requirements.
7. Key inspections, such as Above Ceiling, In-Wall, or Roof inspections shall be coordinated well in advance and designated with milestones on the Contractor managed Overall Project Schedule.

E. Documentation/Reporting:

1. Contractor to coordinate with UPL as to how all logs will be created and tracked per current Auburn University Facilities Management templates.
2. Review submittals/shop drawings for conformance to contract documents and coordination with other trades.
3. Contractor to highlight all required color selections, dimensional verifications, and selection and inclusion of all options.
4. Contractor shall keep updated/approved submittals on-site and distribute approved submittals to all relevant parties. The Owner will need electronic copies of all approved submittals. These should be turned over to UPL as they are approved.
5. Contractor to develop cash flow reports and forecasts.
6. Contractor shall prepare daily reports that track the number of employees, work completed, equipment on site, inspections, deliveries, accidents, weather, etc.
7. Contractor shall prepare and submit to Owner a professionally prepared monthly report that includes:

(1) Executive summary of the project

(2) Subcontracts status

(3) Buyout/Purchasing Log

(4) Estimate vs. Actual Cash flow
(5) OPS, milestone, and 2-week look ahead schedules
(6) Submittal Log
(7) Summary of financials
(8) Back-up logs (RFIs, Submittals, Change Orders, etc.)
(9) Safety reporting
(10) Key progress photos

F. Parking

1. All contractor parking must occur within the project fenced area or the contractor may elect to procure off-campus parking and shuttle the work crews to the site at their expense. The owner will not be responsible in any way for any off-campus worker parking the contractor may elect to procure.
2. Contractor will be responsible for any parking fines incurred from Auburn University Parking Services. Auburn formally request that the Contractor not ask for relief of these fines.
3. Parking on sidewalks and landscaped areas is not allowed for any reason.
4. For interior renovation projects, a pre-bid meeting must be scheduled with UPL for both Design and Construction to discuss provisions for minimum contractor parking.
5. See parking graphics at end of this section for locations where contractor is not allowed to park.

VISITOR PARKING
NO PARKING
RESERVED PARKING
RESERVED PARKING
MOTOR CYCLE PARKING ONLY
15 MINUTE LOADING ZONE
30 MINUTE LOADING ZONE
GENERAL PARKING
PERMIT PARKING ONLY
PERMIT PARKING ONLY
ALL PERMIT PARKING
HILL DORM PERMIT PARKING ONLY
QUAD DORM PERMIT PARKING ONLY
SEWELL DORM PERMIT PARKING ONLY
EXT. DORM PERMIT PARKING ONLY
WEST VILLAGE PERMIT PARKING ONLY
RESIDENT OVERFLOW PARKING ONLY
ZONED PERMIT PARKING
ZONED PERMIT PARKING (RESIDENCE HALLS)
RESERVED PARKING ONLY
RESERVED HALL DIRECTOR ONLY
RESERVED CLINIC PATRONS ONLY
RESERVED STATE SERVICE VEHICLES ONLY
30 MINUTE METERED PARKING
90 MINUTE METERED PARKING
PERMIT PARKING 90 MIN METERED LIMIT
PERMIT PARKING 60 MIN METERED LIMIT
RESERVED PARKING
METER PARKING (PUBLIC)
METER PARKING (ZONED PERMIT)

SECTION 011000 SUMMARY

PART 1 - GENERAL

1.1 PROJECT

A. AU Project Name: Goodwin Hall Renovations and Band Rehearsal Hall Additions.

B. AU Project Number: 15-255

C. Owner: Auburn University
c/o Facilities Management,
West Samford Avenue
Auburn University, AL 36849-5514

D. Architect: Barganier Davis Sims Architects

E. Work: The project consist of the construction of Goodwin Hall Renovations and Band Reheasal Hall Additions.

F. Time of Completion: Work in this contract shall be substantially completed within 240 Calendar days of the date stated in the Notice to Proceed.

G. Liquidated Damages: Shall be in accordance with ABC Form C-8, General Conditions and Article 49 C.

H. Rain Day Class: This project will be Rain Day Class: III (see Supplemental Conditions of the Project I.E.6.b.).

I. Project Sign: (Required).

J. Builder's Risk Insurance: Provided by Auburn University unless otherwise stated.

K. State of Alabama Building Commission Chapter 170x08: Collection of User Fees: Each Bidder is required to include the cost for the Permit Fees required by the State of Alabama Building Commission. Contact the Alabama Building Commission or visit their website for fee calculation.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single Prime contract based on stipulated Price as described in Document ABC Form C-5 Construction Contract (Section 00 0500 of Table of Contents).

1.3 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Provide Access to and from site as required by Law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provided temporary exit signs if exit routes are temporarily altered.

2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Existing building may not be used for storage.

D. Time restrictions: As outlined in Owner's published Design and Construction Standards.

E. Utility Outages and Shutdown: As outlined in Owner's procedures for these activities.

1. Limit disruption of utility services to hours the building is unoccupied.

2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days' notice to Owner and authorities having jurisdiction.

3. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION 011000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

C. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

D. See Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.

E. See Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.

9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit one copy of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   1. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

A. Submittal Time: Submit One Copy of written warranties within thirty days of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Reference General Conditions of the Contract – ARTICLE 48 - IN-PROGRESS and FINAL CLEANUP.

B. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

C. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Emergency manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.

B. See Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, gas leak, water leak, power failure, water outage and equipment failure.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:

D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions that detail essential maintenance procedures:

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

C. See Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one of marked-up Record Prints.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of black-line prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training DVD’s or Manuals .

B. See Divisions 02 through 49 Sections Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit one copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Demonstration and Training DVD’s or Manuals: Submit one copy at end of each training module.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.

D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish an instructor to describe Owner's operational philosophy.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral performance-based test.

3.2 DEMONSTRATION AND TRAINING DVD's or MANUALS

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

END OF SECTION 017900

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

E. PRODUCTS (Not Used)

PART 2 - EXECUTION

2.1 SCHEDULE OF ALTERNATES

Alternate No. 1: Bidders shall state in their Proposal as Alternate No. 1 their price to furnish all Labor and Material to furnish and install all of the renovation work in the existing building except those items specifically identified as items to include in the Base Bid.

Alternate No. 2: Bidders shall state in their Proposal as Alternate No. 2 their price to furnish all Labor and Material to delete the 4" fabric wrapped acoustical wall panels on the North, South, East and West wall indicated above the acoustical shelf. Paint the exposed gypsum board on the walls. Add the acoustical curtains indicated on the drawing, including track, motors, controls, etc. for a complete installation. The curtain below the shelf on the North wall is included in the Base Bid.

Alternate No. 3: Bidders shall state in their Proposal as "Alternate No. 3" their price to furnish all Labor and Material to construct the four (4) offices and corridor in the basement as identified on Drawing 2/A1.0. Include all electrical, mechanical and associated work for a complete installation.

Alternate No. 4: Bidders shall state in their Proposal as "Alternate No. 1" their price to furnish all Labor and Material to install carpet on the floor of instrument Storage 008 and install 6" metal stud partition in lieu of wire partition separating Rooms 101 and 102. Partition to have 5/8" gypsum board each side, painted both sides with rubber base both sides.

END OF SECTION 012300

SECTION 01270 UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Contractor unit prices.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures".

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Owner.

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

E. PRODUCTS (Not Used)

PART 2 - EXECUTION

2.1 LIST OF UNIT PRICES

A. In addition to the Contractor’s Base Bid Sum, the Bidder proposes the following Unit Prices to adjust the Contract Sum (additions and / or deductions) as required. The Bidder understands that such Unit Prices are the total cost to the Owner for each unit of work to include the cost of direct and indirect overhead; profit; labor; materials; equipment; subcontractor; and, any other cost not specifically mentioned, but necessary for the performance of the work units listed below, for every tier involved. The quantities, as measured and multiplied by the Unit Cost are the total cost for the addition or deduction to the Contract Sum.

B. UNIT PRICE SCHEDULE:

1. Attached to Proposal Form at time of Bid (use attached form – see next page).

CONTRACTOR's UNIT PRICE SCHEDULE (Bid Attachment To Proposal Form)

In addition to the Contractor's Base Bid Sum, the Bidder proposes the following Unit Prices to adjust the Contract Sum (additions and / or deductions) as required. The Bidder understands that such Unit Prices are the total cost to the Owner for each unit of work to include the cost of direct and indirect overhead; profit; labor; materials; equipment; subcontractor; and, any other cost not specifically mentioned, but necessary for the performance of the work units listed below, for every tier involved. The quantities, as measured and multiplied by the Unit Cost are the total cost for the addition or deduction to the Contract Sum. 'IAW' shall mean 'In Accordance With'.

These Unit Prices shall be used for unforeseen conditions, Owner / Architect / Engineer directed change orders, and any other extraordinary condition beyond the stated allowances included in Section 01210 that are not included in the Base Bid for this Project.

A. **Unit Price Number One**: Excavation / Removal of Soil Materials:

1. Narrative Description for the Removal of Unsuitable Material and Excess Topsoil – Payment for "Removal of Unsuitable Material and Excess Topsoil" shall be made at the unit price bid, per cubic yard in place (CYIP) removed, and shall be compensation in full for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work. Payment for this item will include Removal of Unsuitable Material and Excess Topsoil underneath the building and surrounding areas. Base bid includes the removal of all structural excavation spoils as deemed necessary at an off-site location. Haul tickets shall not be considered a valid determination of quantities. Following topsoil stripping, the Contractor shall notify the Owner's Representative forty-eight (48) hours before any unsuitable material is excavated, so the area may be delineated and removal depths measured to derive the cubic yards of topsoil removal. Following the removal of unsuitable material, the Contractor shall notify the Owner's Representative forty-eight (48) hours before any replacement material is placed, so the area may be delineated and removal depths measured to derive the cubic yards of unsuitable removal. Failure to notify the Owner's Representative and performing unsuitable excavation without his/her presence for measurement shall forfeit payment of that amount of unobserved work. **Contractor to include 300 cubic yards in the base bid.**

2. Unit of Measure: Cubic Yard In Place (CYIP) $_____

B. **Unit Price Number Two**: Placement of Engineered Fill Material:

1. Narrative Description for the Replacement of Engineered Material– Payment for "Replacement of Unsuitable Material" shall be made at the unit price bid, per cubic yard in place (CYIP) replaced, and shall be compensation in full for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work. Payment for this item will include replacement of Unsuitable Material, to noted elevation grade, which is removed from the project site under the "Removal of Unsuitable Material and Excess Topsoil" item. Haul tickets shall not be considered a valid determination of quantities. The replacement quantity shall be determined the "Removal of Unsuitable Material and Excess Topsoil" item, less topsoil removed. **Contractor to include 300 cubic yards in the base bid.**

2. Unit of Measure: Cubic Yard In Place (CYIP) $_____

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination Drawings.
2. Project meetings.
3. Requests for Interpretation (RFIs).

1.2 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts

and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

    a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit one copy of each submittal. Architect will return one copy.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; State of Alabama Department of Finance Division of Construction Management Building Inspector(If Applicable), major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. See attached State of Alabama Department of Finance Division of Construction Management Pre-Construction Checklist attached to the back of this section..

3. Minutes: Architect will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. The Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility problems.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written recommendations.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.

v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at dates determined from the Pre-Construction Conference. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.

15) RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.6 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B.Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 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. General Conditions of the Contract ABC FORM C-8 August 2001 – ARTICLE 9 SUBMITTALS.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for submitting warranties.
2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
5. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect’s responsive action.

1.4 SUBMITTAL PROCEDURES

A. Electronic submittals are acceptable.

B. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided if requested by Architect for Contractor's use in preparing submittals.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

E. Identification: Place a permanent label or title block on each electronic submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

F. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals**,** without review, received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:

    a. Project name.
    b. Date.
    c. Destination (To:).
    d. Source (From:).
    e. Names of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.
    g. Submittal purpose and description.
    h. Specification Section number and title.
    i. Drawing number and detail references, as appropriate.
    j. Transmittal number[**, numbered consecutively**].
    k. Submittal and transmittal distribution record.
    l. Remarks.
    m. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked " approval notation from Architect's action stamp."

J. Distribution: Furnish electronic copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project.

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Submit electronic submittals directly to extranet specifically established for Project.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Electronic Submittals are acceptable.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data**,** unless submittal of Architect's CAD Drawings are otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.

i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
p. Electronic Shop Drawings are acceptable.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S/ ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.:

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. See Divisions 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.2 DEFINITIONS

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to**,** Owner's construction forces, Architect**,** testing agencies, and authorities having jurisdiction.

B. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service: Electric power from Owner's existing system is NOT available for use without metering and without payment of use charges. Provide temporary power pole and connections and extensions of services as required for construction operations.

1.4 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will NOT be permitted.

F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Use of Owner's existing electric power service will NOT be permitted.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead or underground, unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.

E. Project Identification and Temporary Signs: Provide Project identification and other signs[**as**

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Site Enclosure Fence: Before construction operations begin, furnish and install 48" high orange plastic safety mesh fencing in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking on owner property.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.

C. See Instructions to Bidders, paragraph 7.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use Contractor's own form.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **7** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 7 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

    a. Form of Acceptance: Change Order.
    b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

B. Comparable Product Requests: Submit one copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable

product request within 7 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. See Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

C. See Division 07 Section "Penetration Firestopping" for patching fire-rated construction if applicable.

1.2 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.3 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

Report of Subsurface Exploration and Geotechnical Evaluation
Band Rehearsal Hall Addition – Goodwin Hall
Auburn, Alabama
Building & Earth Project No.: AU170037

Prepared For:
Auburn University Facility Management

May 17, 2017

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

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May 17, 2017

Auburn University Facilities Management
1161 West Samford Avenue
Auburn, Alabama 36849

Attention: David Bess

Subject: Report of Subsurface Exploration and Geotechnical Evaluation
Goodwin Hall
Band Rehearsal Hall Addition
Auburn, Alabama
AU Project No.: 15-255
Building & Earth Project No: AU170037

Dear Mr. Bess:

Building & Earth Sciences, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluation for the Band Rehearsal Hall Addition to Goodwin Hall located on Samford Avenue in Auburn, Alabama.

The purpose of this exploration and evaluation was to determine general subsurface conditions at the site and to address applicable geotechnical aspects of the proposed construction and site development. The recommendations in this report are based on a physical reconnaissance of the site and observation and classification of samples obtained from nine (9) soil test borings conducted at the site. Confirmation of the anticipated subsurface conditions during construction is an essential part of geotechnical services.

We appreciate the opportunity to provide consultation services for the proposed project. If you have any questions regarding the information in this report or need any additional information, please call us.

Respectfully Submitted,

BUILDING & EARTH SCIENCES, INC.

Justin R. Heartsill, P.E.
Project Manager

Mitch Britt, P.E.
Regional Manager

Table of Contents

1.0 PROJECT & SITE DESCRIPTION

The subject site is located on Samford Avenue in Auburn, Alabama. Information relative to the proposed site and the proposed development is listed in Table 1 below. Photographs depicting the current site condition are presented on the following page.

Development Item	Detail	Description
General Site	Size (Ac.)	±0.5 Acres
	Existing Development	The new band hall site is located on the east side of Goodwin Hall. The majority of the site is an existing asphalt parking lot with concrete curb, sidewalks and grassed planter areas.
	Vegetation	Planters containing grass, bushes, and small trees are present around the existing parking lot.
	Slopes	None onsite or proposed.
	Retaining Walls	An existing retaining wall is located on the northern side of the existing parking lot and will be removed during construction.
	Drainage	Surface waters sheet flow to the curb and gutter and drop inlets, generally in the northerly direction.
	Cuts & Fills	Cuts up to 9 feet for the basement excavation.
Proposed Buildings	No. of Bldgs.	1
	Square Ft.	12,000
	Stories	2 stories (ground level FFE 684 and a full basement level FFE 673).
	Construction	The Band Rehearsal Hall will consist of brick veneer, curtain wall system, aluminum storefront, poured in-place concrete exterior walls at lower level, steel columns to support composite floor system which spans over a beam and girder framing system, reinforced masonry walls at the main level, cast in place concrete column, precast coping at parapets, long spanning roof joist supporting roof decking with tapered insulation to roof drains.
	Column Loads	Less than 150 kips (provided by structural)
	Wall Loads	Less than 6.0 kips per linear foot (provided by structural)
	Preferred Foundation	Shallow foundations
	Preferred Slab	Slab on grade

Table 1: Project and Site Description

Reference: Goodwin Hall Renovation and Band Rehearsal Hall Addition Schematic Phase Design Deliverables by AUFM dated 03-13-17

Notes:

1. ***When a grading plan is finalized, Building & Earth should be allowed to review the plan and its effects on our recommendations.***

Figure 1: Project Site, Facing North form B-09

Figure 2: Project Site, Facing North form B-04

2.0 SCOPE OF SERVICES

The authorized subsurface exploration was performed on April 6 and 7, 2017 in conformance with our proposal AU18102R3, dated March 23, 2017. Notice to proceed was received via email from David Bess on March 24, 2017.

The purpose of the geotechnical exploration was to determine general subsurface conditions at specific boring locations and to gather data on which to base a geotechnical evaluation with respect to the proposed construction. The subsurface exploration for this project consisted of nine (9) soil test borings. The site was drilled using a CME 75 truck mounted drill rig equipped with an automatic hammer.

The soil boring locations were determined in the field by a representative of our staff by estimating right angles and measuring distances from existing site features. As such, the boring locations shown on the Boring Location Plan attached to this report should be considered approximate.

The soil samples recovered during our site investigation were visually classified and specific samples were selected by the project engineer for laboratory analysis. The laboratory analysis consisted of:

- Natural Moisture Content: 11 Tests
- Material Finer Than No. 200 Sieve: 3 Tests
- Atterberg Limits: 1 Test
- Standard Proctor: 1 Test
- Consolidated-Undrained Triaxial: 1 Test

The results of the laboratory analysis are presented on the enclosed Boring Logs and in tabular form in the Appendix of this report. Descriptions of the laboratory tests that were performed are also included in the Appendix.

The information gathered from the exploration was evaluated to determine a suitable foundation type for the proposed structure. The information was also evaluated to help determine if any special subgrade preparation procedures will be required during the earthwork phase of the project.

The results of the work are presented within this report that addresses:

- Presentation of laboratory test results on the enclosed Boring Logs and in tabular form in the Appendix.

- Site geology and potential impact on the site development.
- Summary of existing surface conditions.
- A description of the subsurface conditions encountered at the boring locations.
- A description of the current groundwater conditions as observed in the borings. Long-term monitoring was not included in the scope of work.
- Site preparation considerations including material types to be expected at the site, and treatment of unsuitable soils, if encountered.
- Compaction requirements and recommended criteria to establish suitable material for structural backfill.
- Recommendations to be used for foundation design, including appropriate foundation types, bearing pressures, and depths.
- Recommendations for design of below grade basement walls.

3.0 GEOTECHNICAL SITE CHARACTERIZATION

The following discussion is intended to create a general understanding of the site from a geotechnical engineering perspective. It is not intended to be a discussion of every potential geotechnical issue that may arise, nor to provide every possible interpretation of the conditions identified. The following conditions and subsequent recommendations are based on the assumption that significant changes in subsurface conditions do not occur between boreholes. However, anomalous conditions can occur due to variations in existing fill that may be present at the site, or the geologic conditions at the site, and it will be necessary to evaluate the assumed conditions during site grading and foundation installation.

3.1 GEOLOGY

Based on geologic information by the U.S. Geological Survey, the subject site is located in the Piedmont Physiographic Region. The soils found within the Piedmont Region consists of residuum, which are derived from the in-place weathering of parent crystalline rock common to the Piedmont Region. The specific lithological unit found at the site is the Manchester Schist of Precambrian to Paleozoic Age. The Manchester Schist is interlayered muscovite-quartz schist and quartzite, locally contains garnet, sillimanite, and graphite.

3.2 Existing Surface Conditions

The project site is located on the west side of Samford Avenue between Goodwin Hall and M. Miller Gorrie Center. Dudly Hall is located behind (north of) the site.

An asphalt parking lot covers the majority of the ground surface at the site. Several planters and landscaped areas located around the parking lot fall within the limits of the proposed construction. Typically, the planters contain grass, mulch, bushes, and small trees. A retaining wall is located on the northern side of the parking lot between the site and courtyard entrance to Dudly Hall.

Grades across the site range from about 677 to 683 and generally slope to the northeast. Surface water drains to the curb and gutter located on the east side of the parking lot and to the drop inlet located in the north portion of the parking lot.

3.3 Subsurface Conditions

A generalized stratification summary has been prepared using data from the soil test borings and is presented in the table below. The stratification depicts the general soil conditions and strata types encountered during our field investigation.

Stratum No.	Typical Thickness	Description	Consistency
1	6-13 inches	Groundcover: Asphalt and Aggregate Base or Topsoil	N/A
2	2.5-7.5'	Fill Materials: Silty Sand (SM)	Loose to medium dense, N-values of 4 to 22
3	Termination Layer	Residual Soils: Silty Sand (SM)	Loose to dense, N-values of 6 to 32

Table 2: Stratification Summary

Subsurface soil profiles have also been prepared based on the data obtained at the specific boring locations. The subsurface soil profiles are presented in the Appendix. For specific details on the information obtained from individual soil borings, please refer to the Boring Logs included in the Appendix. The elevations of the borings indicated in this report were estimated based on Site Plan sheet C1.0 dated 03-13-2017.

3.3.1 Groundcover

Six (6) of the borings were located in the existing parking lot and encountered asphalt pavement underlain by aggregate base at the ground surface. The asphalt thickness ranged from about 4 to 7 inches and the aggregate base thickness ranged from about 2 to 7 inches. The remaining three borings were located in planters and about 6 to 8 inches

of topsoil was encountered at the ground surface. No testing has been performed to verify that soils meet the requirement of "topsoil". The topsoil depths reported on the boring logs should only be construed as an estimate and topsoil thickness may vary in unexplored portions of the site. A summary of the groundcover encountered at each of the boring locations is shown in the table below.

Boring No.	Asphalt Thickness (inches)	Aggregate Base Thickness (inches)	Topsoil Thickness (inches)
B-01	6.5	6.5	--
B-02	5.5	7	--
B-03	6	6	--
B-04	--	--	8
B-05	6	5	--
B-06	4	2	--
B-07	7	4	--
B-08	--	--	8
B-09	--	--	6

Table 3: Groundcover Summary

3.3.2 Fill Materials

Fill materials were encountered in eight (8) of the borings. The fill consisted of silty sand (SM) and extended to depths of approximately 2.5 to 7.5 feet below existing grades. N-values ranged from 4 to 22, indicating consistencies of loose to medium dense. Gravel was encountered in samples of the fill at boring B-06 and may have inflated some of the N-values in the fill. The majority of the N-values in the fill ranged from 4 to 10. Construction debris was encountered in the fill materials in boring B-07 at a depth of approximately 6 feet below the ground surface.

3.3.3 Residual Soils

Residual soils, materials formed by the in-place weathering of the parent bedrock, were encountered in the borings through the depths explored. The residual soils consisted of silty sand (SM) and ranged in consistency from loose to dense with N-values of 6 to 32.

Laboratory analysis of select samples indicated a gradation of about 27 to 49 percent of the material finer than the No. 200 sieve. Atterberg limit testing indicated the fine portion of the soil was non-plastic. A bulk sample of the sand was collected from the auger cuttings in boring B-03 for standard Proctor and remolded triaxial testing. Based on the standard Proctor test results, these soils have a maximum dry density of about 114.5

pounds per cubic foot at an optimum moisture content of about 14.6 percent. Moisture content testing indicated that soil moisture levels at the site ranged from about 13 to 29 percent. The elevated moisture levels were present in soils at depths below about 6.5 feet.

3.3.4 AUGER REFUSAL

Auger refusal is the drilling depth at which the borehole can no longer be advanced using soil drilling procedures. Auger refusal can occur on hard soil, boulders, buried debris or bedrock. Coring is required to sample the material below auger refusal. No material sufficient to cause auger refusal was encountered in the boring locations.

3.3.5 GROUNDWATER

At the time of drilling, groundwater was encountered in six (6) of the borings. Due to the present site use, the boreholes were backfilled the same day that they were drilled, except for Borings B-04 and B-07. In these two borings, 24 hour groundwater levels were recorded on the day following drilling. Water levels reported are accurate only for the time and date that the borings were drilled. Long term monitoring of the boreholes was not included as part of our subsurface exploration. Groundwater data is included in the following table with the 24 hour measurements shown in parenthesis.

Boring No.	Depth (ft)	Elevation (ft)	Boring No.	Depth (ft)	Elevation (ft)
B-01	19.5	661.5	B-06	--	--
B-02	24	657	B-07	20.5 (7.1)	658.5 (671.9)
B-03	23.5	657.5	B-08	22	656
B-04	-- (13.7)	-- (668.3)	B-09	19	659
B-05	--	--			

Table 4: Groundwater Depth

4.0 SITE DEVELOPMENT CONSIDERATIONS

A schematic submittal by AUFM was available at the time of this report. Based on the finished floor elevations shown in the schematic submittal, we anticipate cuts up to 9 feet will be required to reach finish grades in the building. ***When a grading plan is finalized, Building & Earth should be allowed to review the plan and its effects on our recommendations.***

Based on our evaluation of the subsurface soil information, and the anticipated foundation loads, it appears that construction with a shallow foundation system is feasible. The site development recommendations outlined below are intended for development of the site to support construction with a shallow foundation system. ***If a different type of foundation system is preferred, Building & Earth should be allowed***

to review the site development recommendations to verify that they are appropriate for the preferred foundation system.

The primary geotechnical concerns for this project are:

- The presence of moisture sensitive silty soils at the site.
- Perched groundwater was encountered in some of the borings that will impact the basement excavation. Free draining conditions should be established behind the basement walls. Considerations should be given to waterproofing the basement walls and floor slab.
- The potential for the basement excavation to undermine the existing building (Goodwin Hall). Some type of shored wall system is anticipated to support the building foundations.

Recommendations addressing the site conditions are presented in the following sections.

4.1 Initial Site Preparation

All trees, roots, topsoil, asphalt, aggregate base, and deleterious materials should be removed from the proposed construction areas. Approximately 6 to 8 inches of topsoil were observed in the borings. A geotechnical engineer should observe stripping and grubbing operations to evaluate that all unsuitable materials are removed from locations for proposed construction.

Materials disturbed during clearing operations should be stabilized in place or, if necessary, undercut to undisturbed materials and backfilled with properly compacted, approved structural fill.

During site preparation activities, the contractor should identify borrow source materials that will be used as structural fill and provide samples to the testing laboratory so that conformance to the Structural Fill requirements outlined below and appropriate moisture-density relationship curves can be determined.

4.2 Subgrade Evaluation

We recommend that the project geotechnical engineer or a qualified representative evaluate the subgrade after the site is prepared. Some unsuitable or unstable areas may be present in unexplored areas of the site. All areas that will require fill or that will support structures should be carefully proofrolled with a heavy (40,000 # minimum), rubber-tired vehicle at the following times.

- After an area has been stripped, and undercut if required, prior to the placement of any fill.
- After grading an area to the finished subgrade elevation in a building or pavement area.
- After areas have been exposed to any precipitation, and/or have been exposed for more than 48 hours.

Some instability may exist during construction, depending on climatic and other factors immediately preceding and during construction. If any soft or otherwise unsuitable soils are identified during the proofrolling process, they must be undercut or stabilized prior to fill placement, pavement construction, or floor slab construction. All unsuitable material identified during the construction shall be removed and replaced in accordance with the Structural Fill section of this report.

4.3 Moisture Sensitive Soils

Moisture sensitive silty sands (SM) were encountered across the site during the subsurface exploration. These soils will degrade if allowed to become saturated. Therefore, not allowing water to pond by maintaining positive drainage and temporary dewatering methods (if required) is important to help avoid degradation and softening of the soils.

The contractor should anticipate some difficulty during the earthwork phase of this project if moisture levels are moderate to high during construction. Increased moisture levels will soften the subgrade and the soils may become unstable under the influence of construction traffic. Accordingly, construction during wet weather conditions should be avoided, as this could result in soft and unstable soil conditions that would require ground modification, such as in place stabilization or undercutting.

4.4 Undercutting of Low Consistency Fill

Low consistency fill ($N \leq 5$) was encountered in four of the borings, generally limited to the upper 5 feet below the ground surface. Based on the basement finished floor elevation of 673 feet, the low consistency soils will be removed during grading operations, in order to reach the planned subgrade elevation. Construction debris was encountered in the fill at boring B-07 at depths of about 6.5 to 7 feet. Debris should be completely removed prior to construction of the basement floor slab.

4.5 Structural Fill

Requirements for structural fill on this project are as follows:

Soil Type	USCS Classification	Property Requirements	Placement Location
Sand and Gravel	GW, GP, GM, SW, SP, SM or combinations	Maximum 2" particle size	All locations and depths with proper drainage
Lean Silt Lean Clay	ML, CL, SC, GC	LL<50, PI<25, γ_d>100 pcf	All locations and depths
Elastic Silt Fat Clay	MH, CH	LL>50, PI>25, γ_d>100 pcf	Not suitable for structural fill
On-site soils	SM	As listed above	As listed above

Table 5: Structural Fill Requirements

Notes:

1. LL indicates the soil Liquid Limit; PI indicates the soil Plasticity Index; γ_d indicates the maximum dry density as defined by the density standard outlined in the table below.
2. Laboratory testing of the soils proposed for fill must be performed in order to verify their conformance with the above recommendations.
3. Any fill to be placed at the site should be reviewed by the geotechnical engineer.

Placement requirements for structural fill are as follows:

Specification	Requirement
Lift Thickness	Maximum 8 inch loose lifts when compacted with large heavy compaction equipment. Maximum 6 inch loose lifts when compacted with lightweight compaction equipment (thinner lifts may be required in confined locations).
Density	Minimum of 98% of maximum dry density as defined by ASTM D698 at all locations and depths.
Moisture	± 2 percent of optimum moisture as defined by ASTM D698 for cohesive soils. For cohesionless soils with > 12% passing the US Standard No. 200 sieve, ±3 percent of optimum moisture as defined above. Moisture requirement is waived for cohesionless soils with <12 % passing the No. 200 sieve.
Density Testing Frequency	One test per 2,500 SF in building areas and one test per 5,000 SF in pavement areas with minimum of 3 tests per lift as constructed. One test per 200 feet of trench backfill with minimum of 2 tests per lift as constructed.

Table 6: Structural Fill Placement Requirements

4.6 Excavation Considerations

All excavations performed at the site should follow OSHA guidelines for temporary excavations. Excavated soils should be stockpiled according to OSHA regulations to limit the potential cave-in of soils.

4.6.1 Groundwater

Groundwater was encountered at depths of about 19 to 24 feet at the time of drilling, and after 24-hours, measurements in borings B-04 and B-07 showed groundwater at depths of about 7 to 13 feet below the ground surface. Soils with elevated moisture contents indicate groundwater levels could be at and above the basement slab elevation in some areas. We believe that the groundwater elevations are due to "perched" water conditions. Perched water occurs when water is trapped in a loose, permeable soil layer between or above a dense, low permeable soil layer. Perched water levels are susceptible to fluctuations based on weather conditions. The control of groundwater is expected to be necessary during and after construction, especially during or after periods of heavy rainfall.

The contractor must be prepared to remove groundwater seepage from the excavation if encountered during construction. Excavations extending below groundwater levels will require dewatering systems (such as well points, sump pumps or trench drains). The contractor should evaluate the most economical and practical dewatering method.

4.7 Utility Trench Backfill

All utility trenches must be backfilled and compacted in the manner specified above for structural fill. It may be necessary to reduce the lift thickness to 4 to 6 inches to achieve compaction using hand-operated equipment.

4.8 Landscaping and Drainage Consideration

The potential for soil moisture fluctuations within building areas and pavement subgrades should be reduced to lessen the potential of subgrade movement. Site grading should include positive drainage away from buildings and pavements. Excessive irrigation of landscaping poses a risk of saturating and softening soils below shallow footings and pavements, which could result in settlement of footings and premature failure of pavements.

4.9 Wet Weather Construction

Excessive movement of construction equipment across the site during wet weather may result in ruts, which will collect rainwater, prolonging the time required to dry the subgrade soils.

During rainy periods, additional effort will be required to properly prepare the site and establish/maintain an acceptable subgrade. The difficulty will increase in areas where clay or silty soils are exposed at the subgrade elevation. Grading contractors typically postpone grading operations during wet weather to wait for conditions that are more favorable. Contractors can typically disk or aerate the upper soils to promote drying during intermittent periods of favorable weather. When deadlines restrict postponement of grading operations, additional measures such as undercutting and replacing saturated soils or stabilization can be utilized to facilitate placement of additional fill material.

5.0 FOUNDATION RECOMMENDATIONS

Structural loading conditions for the new building were provided by the structural engineer. The individual column loads will be less than 150 kips and wall loads will be less than 6.0 kips per linear foot. ***If the anticipated structural loading information changes, our office should be contacted, such that our recommendations can be reviewed.***

5.1 SHALLOW FOUNDATIONS

Based on the conditions encountered during our field investigation and after our site preparation and grading recommendations are implemented, the proposed structure can be supported on conventional shallow foundations designed using an allowable soil bearing capacity of 2500 psf.

Even though computed footing dimensions may be less, column footings should be at least 24 inches wide and strip footings should be at least 18 inches wide. These dimensions facilitate hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. They also reduce the potential for localized punching shear failure. ***All exterior footings should bear at least 24 inches below the adjacent exterior grade.*** Total settlement of footings designed and constructed as recommended above should be 1 inch or less.

The following items should be considered during the preparation of construction documents and foundation installation:

- The geotechnical engineer of record should observe the exposed foundation bearing surfaces prior to concrete placement to verify that the conditions anticipated during the subsurface exploration are encountered.
- All bearing surfaces must be free of soft or loose soil prior to placing concrete.
- Concrete should be placed the same day the excavations are completed and bearing materials verified by the engineer. If the excavations are left open for an

extended period, or if the bearing surfaces are disturbed after the initial observation, then the bearing surfaces should be reevaluated prior to concrete placement.

- Water should not be allowed to pond in foundation excavations prior to concrete placement or above the concrete after the foundation is completed.
- Wherever possible, the foundation concrete should be placed "neat", using the sides of the excavations as forms. Where this is not possible, the excavations created by forming the foundations must be backfilled with suitable structural fill and properly compacted.
- The building pad should be sloped to drain away from the building foundations.
- Roof drains should be routed away from the foundation soils.

6.0 FLOOR SLABS

Site development recommendations presented in this report should be followed to provide for subgrade conditions suitable for support of grade supported slabs. Floor slabs for the proposed building should be supported on a minimum four (4) inches thick compacted layer of free-draining, granular material, such as AASHTO No. 610 or 57 stone. The purpose of this layer is to serve as a leveling course and act as a capillary break for moisture migration through the subgrade soil.

Depending on the proposed floor covering, consideration should be given to the use of a polyethylene vapor barrier. The slabs should be appropriately reinforced (if required) to support the proposed loads. Perched water conditions are anticipated in some areas of the basement excavation. We expect the perched water can be collected and routed away from the basement area utilizing the perimeter drains located behind the basement walls. We do not believe that there is a high risk of developing hydrostatic pressure on the slab due to groundwater. However, we do recommend waterproofing measures in an effort to reduce the potential for water to penetrate thru the slab.

With addition of the granular material, an effective modulus of subgrade reaction of 150 pci can be used in the design of grade supported building floor slabs.

7.0 BELOW GRADE WALLS

We recommend that free draining conditions be established behind below grade walls. Free draining granular soils (GW/GP/SW/SP) will not be available onsite to backfill below grade walls. If on site soils are utilized for wall backfill, to promote free draining conditions and reduce the development of hydrostatic pressure on the below grade wall, a 12 inch

wide layer of aggregate material, such as #57 stone, should be placed directly behind the wall. Filter fabric should be placed at the aggregate and soil interface to reduce migration of soil fines into the aggregate layer. The aggregate layer should be tied to a foundation drain that leads to a suitable outfall. The outfall location should be evaluated during design and determined prior to construction. In some applications, a manufactured drainage mat can be adhered to the wall to promote free draining conditions.

Considering the use of onsite soils to backfill the below grade wall, the following earth pressure coefficients are recommended.

Case	Lateral Earth Pressure Coefficient	Total Unit Weight of Soil	Equivalent Fluid Pressure
At Rest Condition	(Ko) = 0.50	130 pcf	65 pcf
Active Condition	(Ka) = 0.33	130 pcf	44 pcf
Passive Condition	(Kp) = 3.00	130 pcf	390 pcf

Table 7: Earth Pressure Coefficients

The given values are based on level backfill and assumes fully drained conditions. If hydrostatic pressure is allowed to build up behind walls, additional pressures will develop. The compacted mass unit weight of the backfill soil should be used with the above earth pressure coefficients to calculate lateral earth pressures. Lateral pressures arising from surcharge loading (column footings, slab loads, live loads), earthquake loading, or other loading conditions that may exist should be added to the above soil earth pressures to determine the total lateral pressures which the structure must resist.

The full development of passive pressure against wall footings require considerable movement of the footing into the soil. We recommend a factor of safety of at least 2 when utilizing passive pressure to resist sliding. Also, no excavations should occur adjacent to the footing. Excavations adjacent to the footing will reduce the available passive pressure recommended. Friction between the footing and soil can also provide resistance to sliding. We recommend a friction factor of 0.35 for concrete to soil contact.

We recommend that waterproofing measures be installed at the basement wall and all concrete joints (wall to footing/slab to footing/slab to wall, etc…) to reduce the potential for water to penetrate into the basement area.

8.0 EXCAVATION NEAR EXISTING STRUCTURES

The excavation for the new basement will require vertical cuts on the order of 10 feet. Cuts to facilitate construction of the basement will impact the existing Goodwin Hall Building along the east perimeter and concrete driveways along the west perimeter. A shoring system will be necessary to allow for construction of the basement in some areas.

In an effort to provide strength data on samples of the residual soil, Building & Earth attempted to obtain undisturbed samples for testing. Due to the high relative densities of the residual soils, undisturbed sampling could not be attempted. A bulk sample was collected from the auger cuttings at boring B-03 for the purpose of evaluating the strength parameters of the residual soils. The soil parameters presented in the following table are based on laboratory analysis of the bulk sample that was remolded to about 98% compaction of standard Proctor density. Considering the consistency of the majority of the residual soils encountered, the shear strengths provided are believed to be on the lower end of shear strength that may be available for the residual soils in an undisturbed condition.

Boring Location	Soil Type	Angle of Internal Friction	Soil Total Weight	Soil Cohesion
B-03, 15'-25'	Silty Sand (SM)	31.3° (Effective) 15.6° (Total)	131 lb/ft^3 (Wet Density)	1.1 psi (Effective) 0.1 psi (Total)

Table 8: Remolded Residual Soil Triaxial Test Results

9.0 SUBGRADE REHABILITATION

The subgrade soils often become disturbed during the period between initial site grading and construction of surface improvements. The amount and depth of disturbance will vary with soil type, weather conditions, construction traffic, and drainage.

The engineer should evaluate the subgrade soil during final grading and prior to stone placement to verify that the subgrade is suitable to receive pavement base or floor slabs. The final evaluation may include proofrolling or density tests.

Subgrade rehabilitation can become a point of controversy when different contractors are responsible for mass and final grading. The construction documents should specifically state which contractor will be responsible for maintaining and rehabilitating the subgrade.

Rehabilitation may include wetting, mixing, and re-compacting soils that have dried excessively or drying soils that have become wet.

10.0 CONSTRUCTION MONITORING

Field verification of site conditions is an essential part of the services provided by the geotechnical consultant. In order to confirm our recommendations, it will be necessary for Building & Earth personnel to make periodic visits to the site during site grading. Typical construction monitoring services are listed below.

- Periodic observations and consultations by a member of our engineering staff during site development
- Continuous monitoring during structural fill placement
- Field density tests during structural fill placement
- Observation and verification of the bearing surfaces exposed after foundation excavation
- Molding and testing of concrete cylinders
- Structural steel inspections

11.0 CLOSING AND LIMITATIONS

This report was prepared for Auburn University Facilities Management, for specific application to the Goodwin Hall Renovation and Band Hall Addition located in Auburn, Alabama. The information in this report is not transferable. This report should not be used for a different development on the same property without first being evaluated by the engineer.

The recommendations in this report were based on the information obtained from our field exploration and laboratory analysis. The data collected is representative of the locations tested. Variations are likely to occur at other locations throughout the site. Engineering judgment was applied in regards to conditions between borings. It will be necessary to confirm the anticipated subsurface conditions during construction.

This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice. No other warranty is expressed or implied. In the event that changes are made, or anticipated to be made, to the nature, design, or location of the project as outlined in this report, Building & Earth must be informed of the changes and given the opportunity to either verify or modify the conclusions of this report in writing, or the recommendations of this report will no longer be valid.

The scope of services for this project did not include any environmental assessment of the site or identification of pollutants or hazardous materials or conditions. If the owner is concerned about environmental issues Building & Earth would be happy to provide an additional scope of services to address those concerns.

This report is intended for use during design and preparation of specifications and may not address all conditions at the site during construction. Contractors reviewing this information should acknowledge that this document is for design information only.

An article published by the Geoprofessional Business Association (GBA), titled *Important Information About Your Geotechnical Report*, has been included in the Appendix. We encourage all individuals to become familiar with the article to help manage risk.

Appendix Table of Contents

GEOTECHNICAL INVESTIGATION METHODOLOGIES

The subsurface exploration, which is the basis of the recommendations of this report, has been performed in accordance with industry standards. Detailed methodologies employed in the investigation are presented in the following sections.

DRILLING PROCEDURES – STANDARD PENETRATION TEST (ASTM D1586)

At each boring location, soil samples were obtained at standard sampling intervals with a split-spoon sampler. The borehole was first advanced to the sample depth by augering and the sampling tools were placed in the open hole. The sampler was then driven 18 inches into the ground with a 140-pound automatic hammer free-falling 30 inches. The number of blows required to drive the sampler each 6-inch increment was recorded. The initial increment is considered the "seating" blows, where the sampler penetrates loose or disturbed soil in the bottom of the borehole.

The blows required to penetrate the final two (2) increments are added together and are referred to as the Standard Penetration Test (SPT) N-value. The N-value, when properly evaluated, gives an indication of the soil's strength and ability to support structural loads. Many factors can affect the SPT N-value, so this result cannot be used exclusively to evaluate soil conditions.

The SPT testing was performed using a drill rig equipped with an automatic hammer. Automatic hammers mechanically control the height of the hammer drop, and doing so, deliver higher energy efficiency (90 to 99 % efficiency) than manual hammers (60 % efficiency) which are dropped using a manually operated rope and cathead system. Because historic data correlations were developed based on use of a manual hammer, it is necessary to adjust the N-values obtained using an automatic hammer to make these correlations valid. Therefore, an energy correction factor of 1.3 was applied to the recorded field N-values from the automatic hammer for the purpose of our evaluation. The N-values discussed or mentioned in this report and shown on the boring logs are recorded field values.

Samples retrieved from the boring locations were labeled and stored in plastic bags at the jobsite before being transported to our laboratory for analysis. The project engineer prepared Boring Logs summarizing the subsurface conditions at the boring locations.

BULK SAMPLING

Bulk sample are obtained for the evaluation of the compaction characteristics of the site soils and for determination of the California Bearing Ratio (CBR). The bulk samples are obtained from manual excavations, backhoe test pits, or from auger cutting. Similar soils are normally combined to provide samples of adequate size for compaction or CBR testing.

BORING LOG DESCRIPTION

Building & Earth Sciences, Inc. used the gINT software program to prepare the attached boring logs. The gINT program provides the flexibility to custom design the boring logs to include the pertinent information from the subsurface exploration and results of our laboratory analysis. The soil and laboratory information included on our logs is summarized below:

DEPTH AND ELEVATION

The depth below the ground surface and the corresponding elevation are shown in the first two columns.

SAMPLE TYPE

The method used to collect the sample is shown. The typical sampling methods include Split Spoon Sampling, Shelby Tube Sampling, Grab Samples, and Rock Core. A key is provided at the bottom of the log showing the graphic symbol for each sample type.

SAMPLE NUMBER

Each sample collected is numbered sequentially

BLOWS PER INCREMENT, REC%, RQD%

When Standard Split Spoon sampling is used, the blows required to drive the sampler each 6-inch increment are recorded and shown in column 5. When rock core is obtained the recovery ration (REC%) and Rock Quality Designation (RQD%) is recorded.

SOIL DATA

Column 6 is a graphic representation of four different soil parameters. Each of the parameters use the same graph, however, the values of the graph subdivisions vary with each parameter. Each parameter presented on column 6 is summarized below:

- N-value- The Standard Penetration Test N-value, obtained by adding the number of blows required to drive the sampler the final 12 inches, is recorded . The graph labels range from 0 to 50.
- Qu – Unconfined Compressive Strength estimate from the Pocket Penetrometer test in tons per square foot (tsf). The graph labels range from 0 to 5 tsf.
- Atterberg Limits – The Atterberg Limits are plotted with the plastic limit to the left, and liquid limit to the right, connected by a horizontal line. The difference in the plastic and liquid limits is referred to as the Plasticity Index. The Atterberg Limits test results are also included in the Remarks column on the far right of the boring log. The Atterberg Limits graph labels range from 0 to 100%.
- Moisture – The Natural Moisture Content of the soil sample as determined in our laboratory.

SOIL DESCRIPTION

The soil description prepared in accordance with ASTM D2488, Visual Description of Soil Samples. The Munsel Color chart is used to determine the soil color. Strata changes are indicated by a solid line, with the depth of the change indicated on the left side of the line and the elevation of the change indicated on the right side of the line. If subtle changes within a soil type occur, a broken line is used. The Boring Termination or Auger Refusal depth is shown as a solid line at the bottom of the boring.

GRAPHIC

The graphic representation of the soil type is shown. The graphic used for each soil type is related to the Unified Soil Classification chart. A chart showing the graphic associated with each soil classification is included.

REMARKS

Remarks regarding borehole observations, and additional information regarding the laboratory results and groundwater observations.

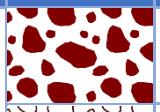
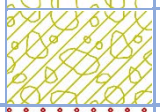
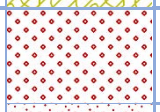
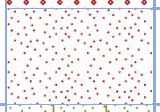
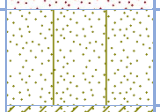
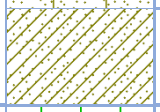
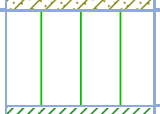
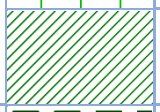
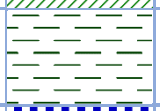
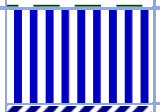
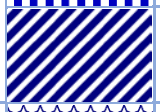
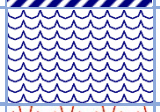
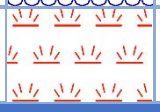
Major Divisions			Symbols		Group Name & Typical Description
			Lithology	Group	
Coarse Grained Soils *More than 50% of material is larger than No. 200 sieve size*	**Gravel and Gravelly Soils** *More than 50% of coarse fraction is larger than No. 4 sieve*	**Clean Gravels** *(Less than 5% fines)*		**GW**	*Well-graded gravels, gravel – sand mixtures, little or no fines*
				**GP**	*Poorly-graded gravels, gravel – sand mixtures, little or no fines*
		Gravels with Fines *(More than 12% fines)*		**GM**	*Silty gravels, gravel – sand – silt mixtures*
				**GC**	*Clayey gravels, gravel – sand – clay mixtures*
	Sand and Sandy Soils *More than 50% of coarse fraction is smaller than No. 4 sieve*	**Clean Sands** *(Less than 5% fines)*		**SW**	*Well-graded sands, gravelly sands, little or no fines*
				**SP**	*Poorly-graded sands, gravelly sands, little or no fines*
		Sands with Fines *(More than 12% fines)*		**SM**	*Silty sands, sand – silt mixtures*
				**SC**	*Clayey sands, sand – clay mixtures*
Fine Grained Soils *More than 50% of material is smaller than No. 200 sieve size*	**Silts and Clays** *Liquid Limit less than 50*	**Inorganic**		**ML**	*Inorganic silts and very find sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity*
				**CL**	*Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays*
		Organic		**OL**	*Organic silts and organic silty clays of low plasticity*
	Silts and Clays *Liquid Limit greater than 50 sieve*	**Inorganic**		**MH**	*Inorganic silts, micaceous or diatomaceous fine sand, or silty soils*
				**CH**	*Inorganic clays of high plasticity*
		Organic		**OH**	*Organic clays of medium to high plasticity, organic silts*
Highly Organic Soils				**PT**	*Peat, humus, swamp soils with high organic contents*

Table 1: Soil Classification Chart (based on ASTM D2487)

Building & Earth Sciences classifies soil in general accordance with the Unified Soil Classification System (USCS) presented in ASTM D2487. Table 1 and Figure 1 exemplify the general guidance of the USCS. Soil consistencies and relative densities are presented in general accordance with Terzaghi, Peck, & Mesri's (1996) method, as shown on Table 2, when quantitative field and/or laboratory data is available. Table 2 includes Consistency and Relative Density correlations with N-values obtained using either a manual hammer (60 percent efficiency) or automatic hammer (90 percent efficiency). The *Blows Per Increment* and *SPT N-values* displayed on the boring logs are the unaltered values measured in the field. When field and/or laboratory data is not available, we may classify soil in general accordance with the Visual Manual Procedure presented in ASTM D2488.

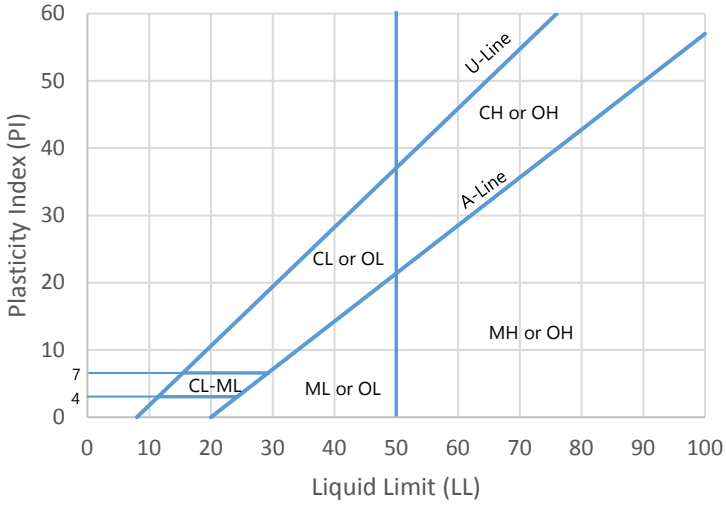


Figure 1: Plasticity Chart (based on ASTM D2487)

Non-cohesive: Coarse-Grained Soil			**Cohesive: Fine-Grained Soil**			
SPT Penetration (blows/foot)		**Relative Density**	**SPT Penetration (blows/foot)**		**Consistency**	**Estimated Range of Unconfined Compressive Strength (tsf)**
			Automatic Hammer*	Manual Hammer		
Automatic Hammer*	Manual Hammer		< 2	< 2	Very Soft	< 0.25
0 - 3	0 - 4	Very Loose	2 - 3	2 - 4	Soft	0.25 – 0.50
3 - 8	4 - 10	Loose	3 - 6	4 - 8	Medium Stiff	0.50 – 1.00
8 - 23	10 - 30	Medium Dense	6 - 12	8 - 15	Stiff	1.00 – 2.00
23 - 38	30 - 50	Dense	12 - 23	15 - 30	Very Stiff	2.00 – 4.00
> 38	> 50	Very Dense	> 23	> 30	Hard	> 4.00

Table 2: Soil Consistency and Relative Density (based on Terzaghi, Peck & Mesri, 1996)

* - Modified based on 80% hammer efficiency

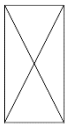
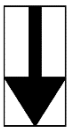
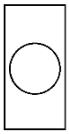
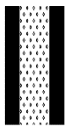
	Standard Penetration Test ASTM D1586 or AASHTO T-206		Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399
	Shelby Tube Sampler ASTM D1587		No Sample Recovery
	Rock Core Sample ASTM D2113		Groundwater at Time of Drilling
	Auger Cuttings		Groundwater as Indicated

Table 1: Symbol Legend

Soil	Particle Size	U.S. Standard
Boulders	Larger than 300 mm	N.A.
Cobbles	300 mm to 75 mm	N.A.
Gravel	75 mm to 4.75 mm	3-inch to #4 sieve
Coarse	75 mm to 19 mm	3-inch to ¾-inch sieve
Fine	19 mm to 4.75 mm	¾-inch to #4 sieve
Sand	4.75 mm to 0.075 mm	#4 to #200 Sieve
Coarse	4.75 mm to 2 mm	#4 to #10 Sieve
Medium	2 mm to 0.425 mm	#10 to #40 Sieve
Fine	0.425 mm to 0.075 mm	#40 to #200 Sieve
Fines	Less than 0.075 mm	Passing #200 Sieve
Silt	Less than 5 µm	N.A.
Clay	Less than 2 µm	N.A.

Table 2: Standard Sieve Sizes

N-Value 	Standard Penetration Test Resistance calculated using ASTM D1586 or AASHTO T-206. Calculated as sum of original, field recorded values.	Atterberg Limits  PL LL	A measure of a soil's plasticity characteristics in general accordance with ASTM D4318. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL).
Qu 	Unconfined compressive strength, typically estimated from a pocket penetrometer. Results are presented in tons per square foot (tsf).	% Moisture	Percent natural moisture content in general accordance with ASTM D2216.

Table 3: Soil Data

Hollow Stem Auger	Flights on the outside of the shaft advance soil cuttings to the surface. The hollow stem allows sampling through the middle of the auger flights.
Mud Rotary / Wash Bore	A cutting head advances the boring and discharges a drilling fluid to support the borehole and circulate cuttings to the surface.
Solid Flight Auger	Flights on the outside bring soil cuttings to the surface. Solid stem requires removal from borehole during sampling.
Hand Auger	Cylindrical bucket (typically 3-inch diameter and 8 inches long) attached to a metal rod and turned by human force.

Table 4: Soil Drilling Methods

Descriptor	Meaning
Trace	Likely less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

Table 5: Descriptors

Manual Hammer	The operator tightens and loosens the rope around a rotating drum assembly to lift and drop a sliding, 140-pound hammer falling 30 inches.
Automatic Trip Hammer	An automatic mechanism is used to lift and drop a sliding, 140-pound hammer falling 30 inches.
Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399	Uses a 15-pound steel mass falling 20 inches to strike an anvil and cause penetration of a 1.5-inch diameter cone seated in the bottom of a hand augered borehole. The blows required to drive the embedded cone a depth of 1-3/4 inches have been correlated by others to N-values derived from the Standard Penetration Test (SPT).

Table 6: Sampling Methods

Non-plastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Table 7: Plasticity

Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, usually soil is below water table.

Table 8: Moisture Condition

Stratified	Alternating layers of varying material or color with layers at least ½ inch thick.
Laminated	Alternating layers of varying material or color with layers less than ¼ inch thick.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensides	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Table 9: Structure

KEY TO HATCHES

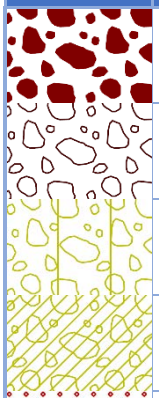
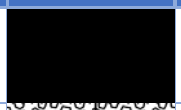
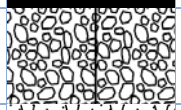
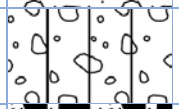
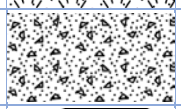
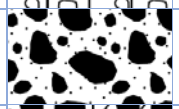
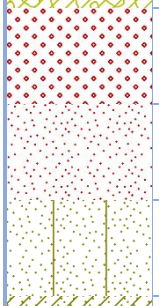
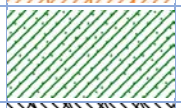
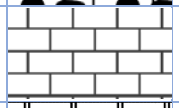
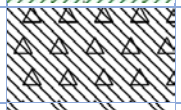
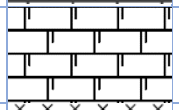
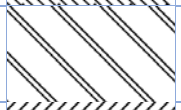
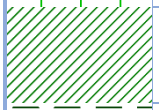
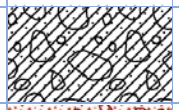
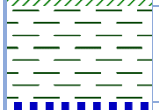
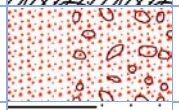
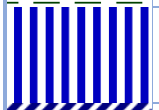
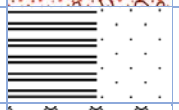
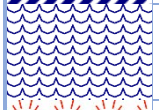
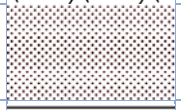
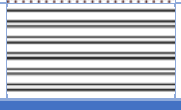
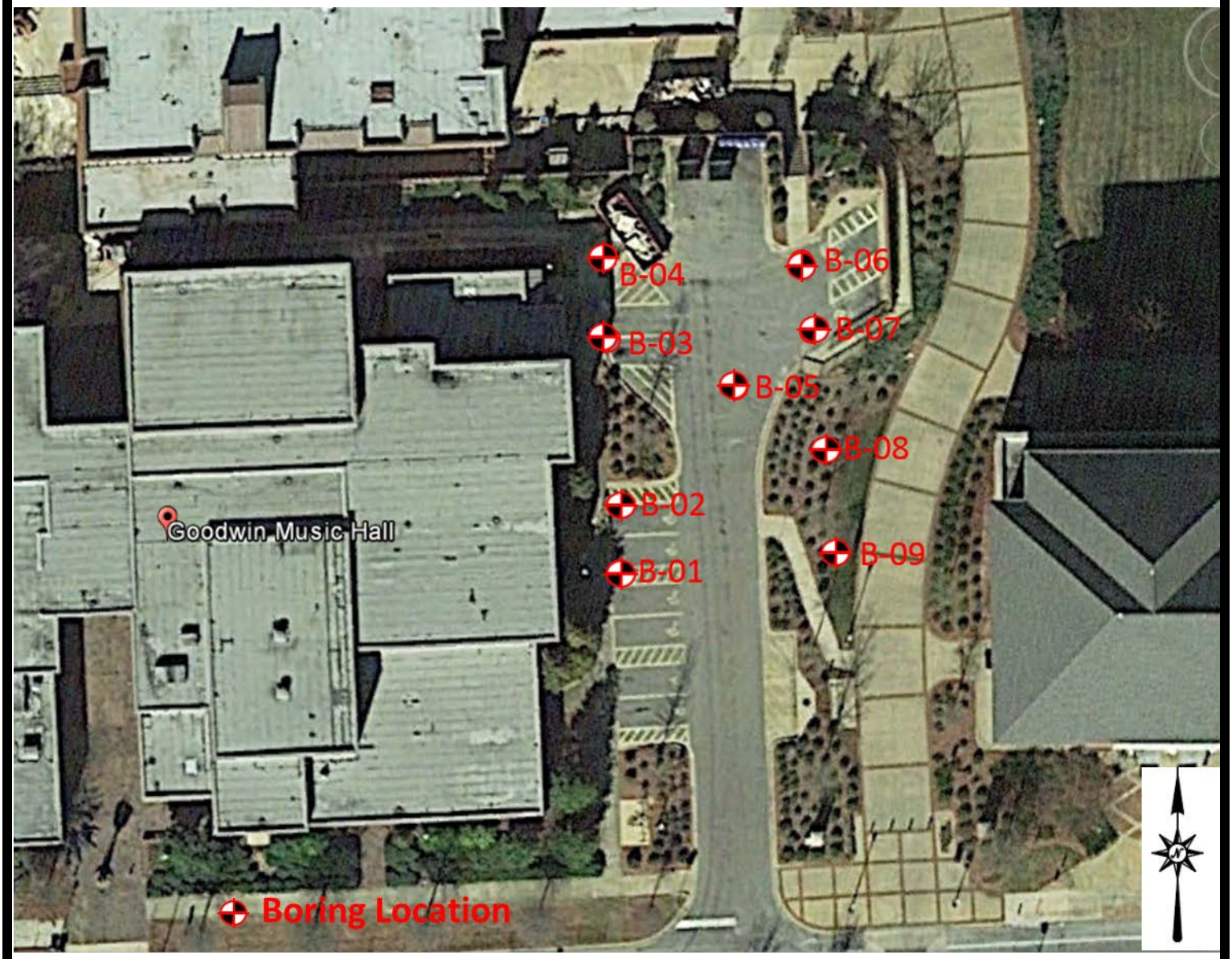
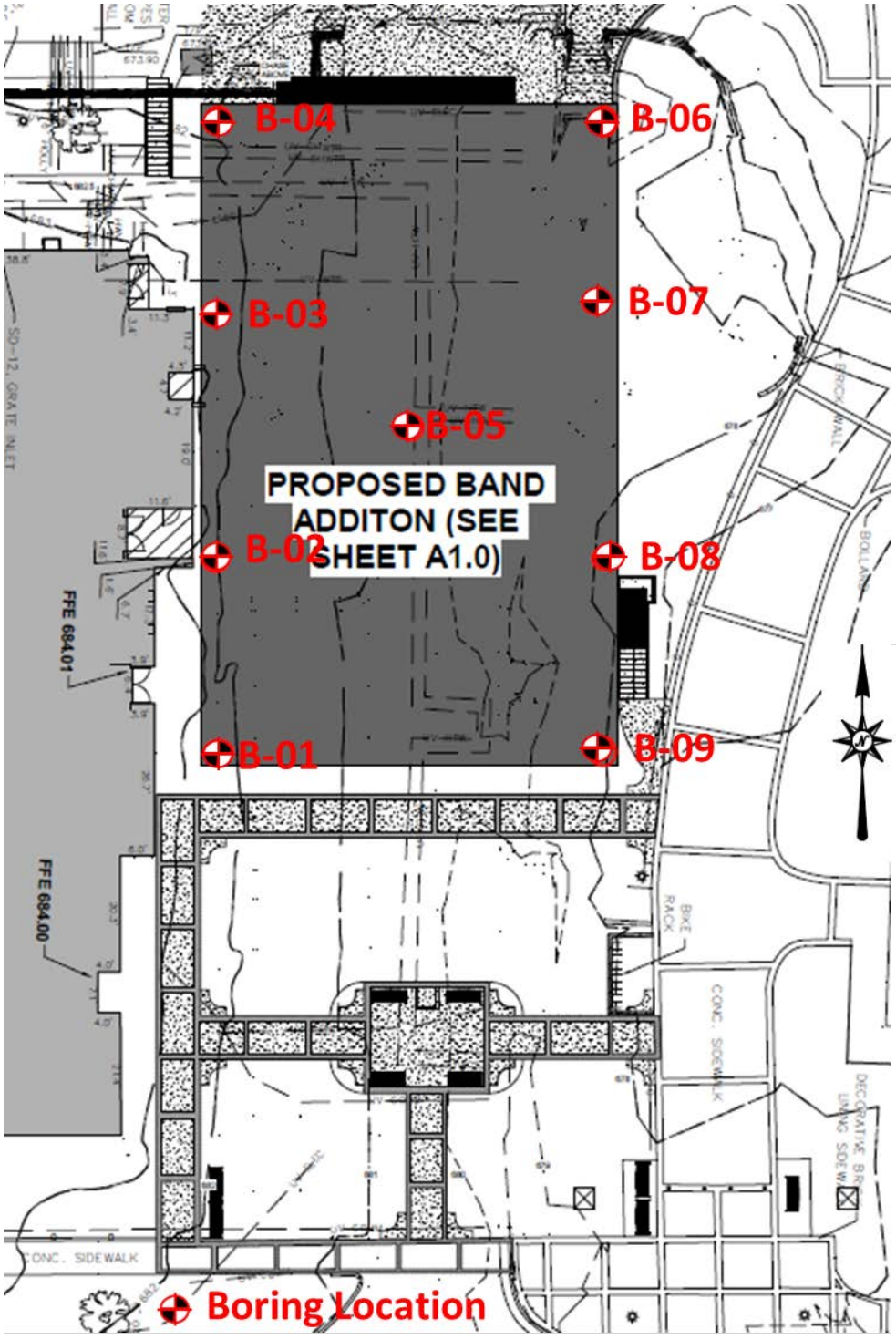
Hatch	Description	Hatch	Description	Hatch	Description
	***GW*** *- Well-graded gravels, gravel – sand mixtures, little or no fines*		*Asphalt*		*Clay with Gravel*
	GP *- Poorly-graded gravels, gravel – sand mixtures, little or no fines*		*Aggregate Base*		*Sand with Gravel*
	GM *- Silty gravels, gravel – sand – silt mixtures*		*Topsoil*		*Silt with Gravel*
	GC *- Clayey gravels, gravel – sand – clay mixtures*		*Concrete*		*Gravel with Sand*
	***SW*** *- Well-graded sands, gravelly sands, little or no fines*		*Coal*		*Gravel with Clay*
	SP *- Poorly-graded sands, gravelly sands, little or no fines*		*Silty Clay*		*Gravel with Silt*
	SM *- Silty sands, sand – silt mixtures*		*Sandy Clay*		*Limestone*
	SC *- Clayey sands, sand – clay mixtures*		*Clayey Chert*		*Chalk*
	ML *- Inorganic silts and very find sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity*		*Low and High Plasticity Clay*		*Siltstone*
	***CL*** *- Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays*		*Low Plasticity Silt and Clay*		*Till*
	***OL*** *- Organic silts and organic silty clays of low plasticity*		*High Plasticity Silt and Clay*		*Sandy Clay with Cobbles and Boulders*
	***MH*** *- Inorganic silts, micaceous or diatomaceous fine sand, or silty soils*		*Fill*		*Sandstone with Shale*
	***CH*** *- Inorganic clays of high plasticity*		*Weathered Rock*		*Coral*
	***OH*** *- Organic clays of medium to high plasticity, organic silts*		*Sandstone*		*Boulders and Cobbles*
	***PT*** *- Peat, humus, swamp soils with high organic contents*		*Shale*		*Soil and Weathered Rock*

Table 1: Key to Hatches Used for Boring Logs and Soil Profiles

BORING LOCATION PLAN

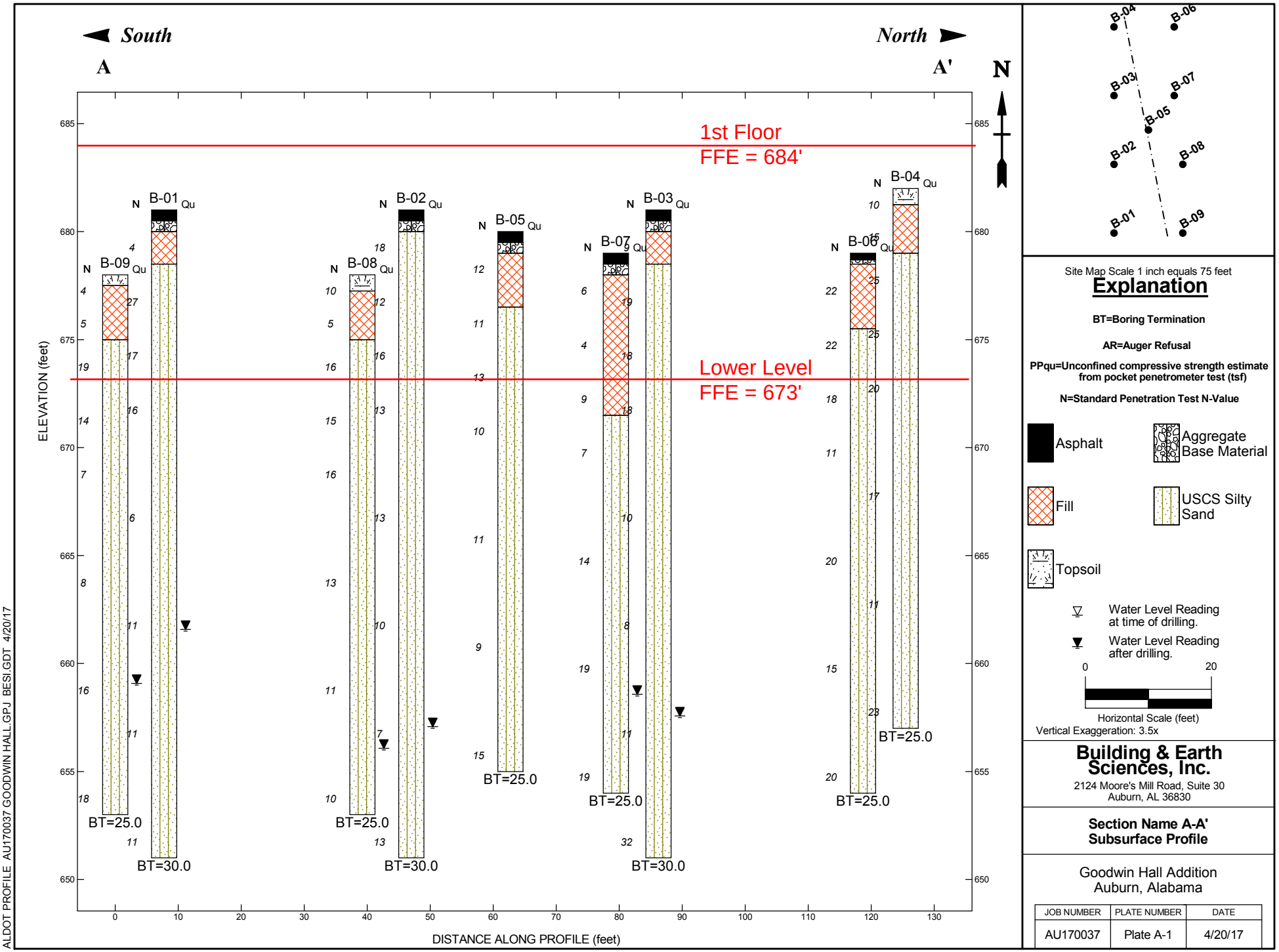


REFERENCE USED TO PRODUCE THIS DRAWING:	**BORING LOCATION PLAN** **Existing Conditions**	**DATE:**	**SCALE:**
		5/4/2017	**NTS**
Google Earth	**PROJECT NO:**	**PROJECT NAME / LOCATION:**	BUILDING & EARTH Geotechnical, Environmental, and Materials Engineers
	AU170037	**Goodwin Hall** **Auburn University** **Auburn, Alabama**	



REFERENCE USED TO PRODUCE THIS DRAWING:	**BORING LOCATION PLAN** **Proposed Construction**	**DATE:** 5/4/2017	**SCALE:** NTS
Site Plan Sheet C1.0	**PROJECT NO:** **AU170037**	**PROJECT NAME / LOCATION:** **Goodwin Hall** **Auburn University** **Auburn, Alabama**	BUILDING & EARTH Geotechnical, Environmental, and Materials Engineers

SUBSURFACE SOIL PROFILES



Site Map Scale 1 inch equals 75 feet

Explanation

BT=Boring Termination

AR=Auger Refusal

PPqu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)

N=Standard Penetration Test N-Value

- Asphalt
- Aggregate Base Material
- Fill
- USCS Silty Sand
- Topsoil
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

0 20

Horizontal Scale (feet)

Vertical Exaggeration: 3.5x

Building & Earth Sciences, Inc.

2124 Moore's Mill Road, Suite 30
Auburn, AL 36830

Section Name A-A'
Subsurface Profile

Goodwin Hall Addition
Auburn, Alabama

JOB NUMBER	PLATE NUMBER	DATE
AU170037	Plate A-1	4/20/17

ALDOT PROFILE AU170037 GOODWIN HALL.GPJ BESI.GDT 4/20/17

BORING LOGS

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-01

Sheet 1 of 1

2124 Moore's Mill Road, Suite 30
Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: SW Corner of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 681
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	SOIL DESCRIPTION	GRAPHIC	REMARKS
				N-Value 10 20 30 40; Qu (tsf) 1 2 3 4; Atterberg Limits 20 40 60 80; % Moisture 20 40 60 80			
0	680	⊠	1	1-2-2	0.5 ASPHALT = 6.5 Inches (680.5)		
					1.0 AGGREGATE BASE = 6.5 Inches (680.0)		
					2.5 SILTY SAND (SM): loose, orange and tan, fine (FILL) (678.5)		
		⊠	2	6-12-15	SILTY SAND (SM): dense, red, orange, and tan, fine		
5	675	⊠	3	3-6-11	- medium dense		
		⊠	4	5-9-7	- orange, red, tan, and black, saprolitc		
10	670						
		⊠	5	1-2-4	- loose		
15	665						
		⊠	6	2-4-7	- medium dense ▼		Groundwater was encountered at 19.5' at time of drilling
20	660						
		⊠	7	3-4-7			
25	655						
		⊠	8	1-4-7	30.0 (RESIDUAL) (651.0)		
30	650				Boring terminated at 30'		Boring backfilled on 4/6/2017
							Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ⊠ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-02

Sheet 1 of 1

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Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: W Side of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 681
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	SOIL DESCRIPTION	GRAPHIC	REMARKS
					0.5 ASPHALT = 5.5 Inches (680.5)		
					1.0 AGGREGATE BASE = 7 Inches (680.0)		
0	680	⊠	1	4-7-11	SILTY SAND (SM): medium dense, orange and tan, fine		
		⊠	2	4-9-3			
5	675	⊠	3	5-7-9	- red, orange, and tan		
		⊠	4	4-5-8			
10	670						
		⊠	5	5-5-8			
15	665						
		⊠	6	3-4-6	- orange, red, tan, and black, saprolitc		
20	660						
		⊠	7	3-3-4	- loose ▼		Groundwater was encountered at 24' at time of drilling
25	655						
		⊠	8	4-7-6	- medium dense		
30	650				30.0 (RESIDUAL) (651.0) Boring terminated at 30'		Boring backfilled on 4/6/2017

Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ⊠ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-03

Sheet 1 of 1

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Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: W Side of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 681
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	680	⊠	1	2-4-5		0.5 ASPHALT = 6 Inches (680.5)		
						1.0 AGGREGATE BASE = 6 Inches (680.0)		
						2.5 SILTY SAND (SM): medium dense, orange and tan, fine (FILL) (678.5)		
		⊠	2	4-8-11		SILTY SAND (SM): medium dense, red, orange, and tan, fine		
5	675	⊠	3	5-7-11				Sample #3 % Passing #200 Sieve: 27.9
		⊠	4	4-8-10				
10	670							
		⊠	5	3-4-6		- orange, red, tan, and black, saprolitic		
15	665							
		⊠	6	2-3-5				
20	660							
		⊠	7	3-4-7				Groundwater was encountered at 23.5' at time of drilling
25	655							
		⊠	8	8-12-20		- dense		
30	650					30.0 (RESIDUAL) (651.0)		
						Boring terminated at 30'		Boring backfilled on 4/6/2017

Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ⊠ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-04

Sheet 1 of 1

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Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
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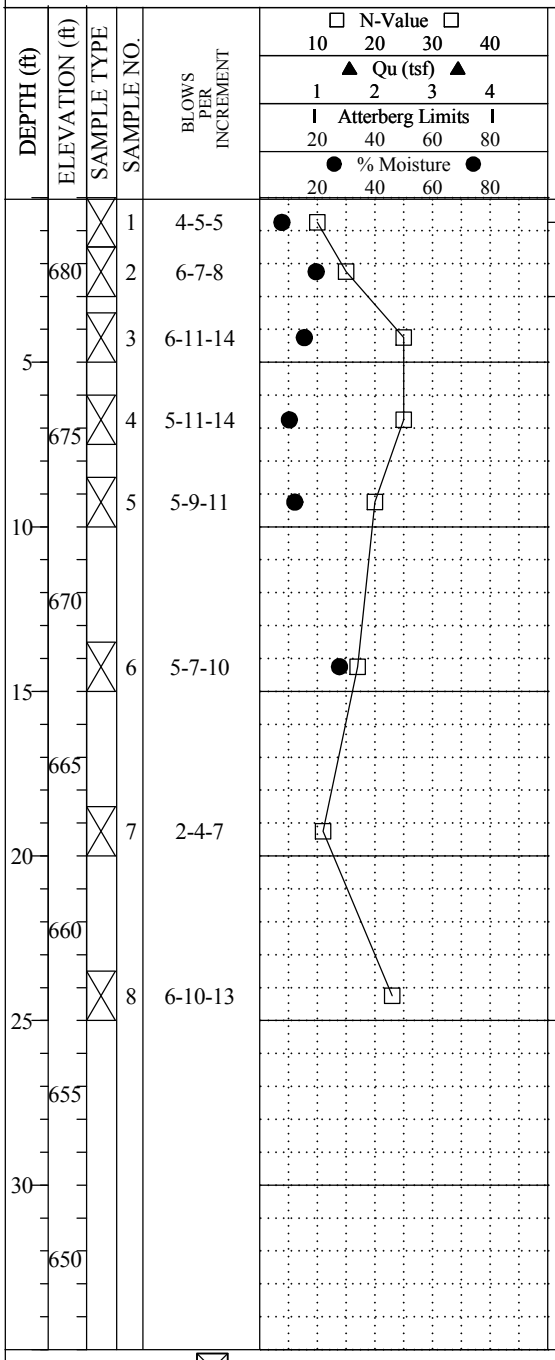
Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: NW Corner of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 682
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick



SOIL DESCRIPTION

0.8 TOPSOIL = 8 inches — 681.3

SILTY SAND (SM): medium dense, tan and orange, fine

3.0 - brown — 679.0

(FILL)

SILTY SAND (SM): dense, red, orange, and tan, fine

- medium dense

- red, orange, tan, and black, saprolitc

- dense

25.0 (RESIDUAL) — 657.0

Boring terminated at 25'

GRAPHIC

REMARKS

Sample #6
% Passing #200 Sieve: 49.8

24 hour groundwater measurement: 13.7'

Groundwater was not encountered at time of drilling

Boring backfilled on 4/7/2017 after 24 hour groundwater reading

Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ☒ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

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LOG OF BORING

Designation: B-05

Sheet 1 of 1

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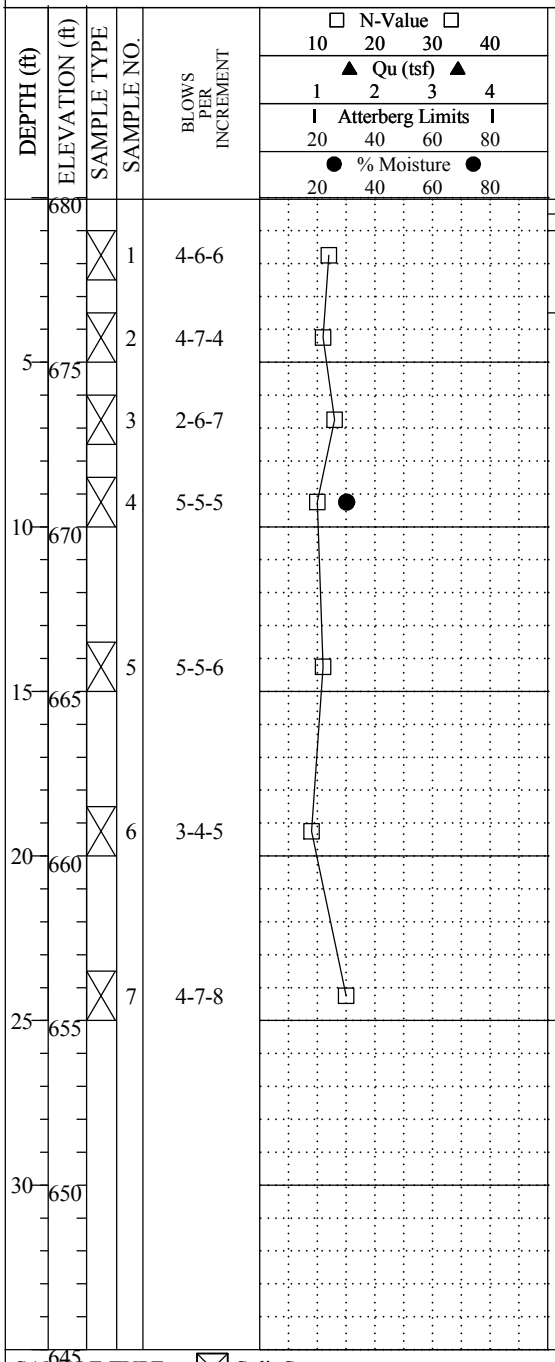
Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: Center of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 680
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick



SOIL DESCRIPTION

0.5 ASPHALT = 6 Inches — 679.5
1.0 AGGREGATE BASE = 5 Inches — 679.0
SILTY SAND (SM): medium dense, orange and tan, fine
3.5 (FILL) — 676.5
SILTY SAND (SM): medium dense, red, orange, and tan, fine

- saprolitic

25.0 (RESIDUAL) — 655.0
Boring terminated at 25'

GRAPHIC

REMARKS

Groundwater was not encountered at time of drilling

Boring backfilled on 4/6/2017

Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ☒ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

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Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-06

Sheet 1 of 1

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Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: NE Corner of Building

Project Location: Auburn, Alabama
Date Drilled: 4/7/17
Weather Conditions: Clear, 70°
Surface Elevation: 679
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	SOIL DESCRIPTION	GRAPHIC	REMARKS
0						0.3 ASPHALT = 4 Inches — 678.7		
						0.5 AGGREGATE BASE = 2 Inches — 678.5		
						SILTY SAND (SM): medium dense, orange and tan, fine, with some gravel (FILL)		
	675		1	13-13-9		3.5 — 675.5		
5			2	7-9-13		SILTY SAND (SM): medium dense, red, orange, and tan, fine		
			3	4-10-8				
	670		4	5-5-6				
10								
	665		5	2-7-13		- orange, red, tan, and black, saprolitic		
15								
	660		6	4-7-8				
20								
	655		7	5-8-12		25.0 (RESIDUAL) — 654.0		
25						Boring terminated at 25'		
	650							Groundwater was not encountered at time of drilling
30								Boring backfilled on 4/6/2017
	645							Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ☒ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-07

Sheet 1 of 1

2124 Moore's Mill Road, Suite 30
Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: E Side of Building

Project Location: Auburn, Alabama
Date Drilled: 4/6/17
Weather Conditions: Clear, 70°
Surface Elevation: 679
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	SOIL DESCRIPTION	GRAPHIC	REMARKS
					0.5 ASPHALT = 7 Inches (678.5)		
					1.0 AGGREGATE BASE = 4 Inches (678.0)		
		X	1	4-3-3	SILTY SAND (SM): loose, tan, fine		
	675	X	2	1-2-2	- orange and tan		
5		X	3	6-5-4	- with some construction waste materials		
					7.5 (FILL) (671.5)		24 hour groundwater measurement: 7.1'
	670	X	4	3-3-4	SILTY SAND (SM): loose, orange, red, and tan, fine		
10							
	665	X	5	3-6-8	- medium dense, orange, red, tan, and black, saprolitic		
15							
	660	X	6	4-7-12			Groundwater was encountered at 20.5' at time of drilling
20							
	655	X	7	5-8-11	25.0 (RESIDUAL) (654.0)		
25					Boring terminated at 25'		
	650						
30							Boring backfilled on 4/7/2017 after 24 hour groundwater reading
	645						Consistency/Relative density based on correction factor for automatic hammer

N-Value: 10 20 30 40
Qu (tsf): 1 2 3 4
Atterberg Limits: 20 40 60 80
% Moisture: 20 40 60 80

SAMPLE TYPE ☒ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-08

Sheet 1 of 1

2124 Moore's Mill Road, Suite 30
Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: E Side of Building

Project Location: Auburn, Alabama
Date Drilled: 4/7/17
Weather Conditions: Clear, 70°
Surface Elevation: 678
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	678					0.8 TOPSOIL = 8 inches	677.3	
		⊠	1	3-4-6		SILTY SAND (SM): medium dense, orange and tan, fine		
		⊠	2	2-2-3		3.0 - loose	675.0	
	675					(FILL)		
		⊠	3	4-6-10		SILTY SAND (SM): medium dense, tan and orange, fine		
5								
		⊠	4	4-7-8				
	670	⊠	5	4-8-8		- tan, orange, and red		
10								
	665	⊠	6	3-5-8		- red, orange, tan, and black, saprolitc		
15								
	660	⊠	7	2-4-7				
20								Groundwater was encountered at 22' at time of drilling
	655	⊠	8	3-5-5		25.0 (RESIDUAL)	653.0	
25						Boring terminated at 25'		
	650							
30								Boring backfilled on 4/6/2017
	645							Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ⊠ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-09

Sheet 1 of 1

2124 Moore's Mill Road, Suite 30
Auburn, AL 36830
Office: (334) 821-1445
Fax: (334) 821-1448
www.BuildingAndEarth.com

Project Name: Goodwin Hall Addition
Project Number: AU170037
Drilling Method: Hollow Stem Auger
Equipment Used: CME 75
Hammer Type: Automatic
Boring Location: SE Corner of Building

Project Location: Auburn, Alabama
Date Drilled: 4/7/17
Weather Conditions: Clear, 70°
Surface Elevation: 678
Drill Crew: L. Perkins, A. Baker
Logged By: J. Patrick

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	N-Value / Qu (tsf) / Atterberg Limits / % Moisture	SOIL DESCRIPTION	GRAPHIC	REMARKS
0	678					0.5 TOPSOIL = 6 inches	677.5	
		⊠	1	2-2-2		SILTY SAND (SM): medium stiff, brown, fine		
		⊠	2	2-2-3		3.0 (FILL)	675.0	
	675	⊠	3	2-7-12		SILTY SAND (SM): medium dense, red, orange, and tan, fine		
5		⊠	4	5-6-8				
	670	⊠	5	2-3-4		- loose		
10								
	665	⊠	6	1-3-5		- medium dense, red, orange, tan, and black, saprolitc		
15								
	660	⊠	7	5-7-9		▼		Groundwater was encountered at 19' at time of drilling
20								
	655	⊠	8	6-9-9		25.0 (RESIDUAL)	653.0	
25						Boring terminated at 25'		
	650							
30								Boring backfilled on 4/6/2017
	645							Consistency/Relative density based on correction factor for automatic hammer

SAMPLE TYPE ⊠ Split Spoon

N-VALUE	STANDARD PENETRATION RESISTANCE (AASHTO T-206)	**REC**	RECOVERY
% MOISTURE	PERCENT NATURAL MOISTURE CONTENT	**RQD**	ROCK QUALITY DESIGNATION
▽	GROUNDWATER LEVEL IN THE BOREHOLE	**UD**	UNDISTURBED
Qu	UNCONFINED COMPRESSIVE STRENGTH ESTIMATE FROM POCKET PENETROMETER TEST		

LOG OF BORING 2 AU170037 GOODWIN HALL.GPJ BESI.GDT 5/11/17

LABORATORY TEST PROCEDURES

A brief description of the laboratory tests performed is provided in the following sections.

DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested in accordance with the aforementioned laboratory-testing program to determine soil classifications and engineering properties. This data was used to correlate our visual descriptions with the Unified Soil Classification System (USCS).

NATURAL MOISTURE CONTENT (ASTM D2216)

Natural moisture contents (M%) were determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles.

ATTERBERG LIMITS (ASTM D4318)

The Atterberg Limits test was performed to evaluate the soil's plasticity characteristics. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The Plastic Limit is the moisture content at which the soil is between "plastic" and the semi-solid stage. The Plasticity Index (PI = LL - PL) is a frequently used indicator for a soil's potential for volume change. Typically, a soil's potential for volume change increases with higher plasticity indices.

MATERIAL FINER THAN NO. 200 SIEVE BY WASHING (ASTM D1140)

Grain-size tests were performed to determine the partial soil particle size distribution. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) was determined by washing soil over the No. 200 sieve. The results of wash #200 tests are presented on the boring logs included in this report and in the table of laboratory test results.

STANDARD PROCTOR COMPACTION TEST (ASTM D698)

Standard Proctor compaction tests were performed to determine the maximum dry density and optimum moisture content for the soil, for use as a comparative basis during fill placement. The Standard Proctor test consists of the compaction of soil with known moisture content into a steel mold of fixed height and diameter. The soil is compacted in the mold in three lifts of equal volume using a 5.5 lb. manual hammer with a 12-inch free fall, to produce a consistent compactive effort. The test procedure is repeated on samples at several different moisture contents until a curve showing the relationship between moisture content and dry density of the soil is established. From this curve, the maximum dry density (peak density value) and optimum moisture content (moisture content correlating to the maximum dry density) are obtained.

TRIAXIAL SHEAR TEST (CONSOLIATED-UNDRAINED) (ASTM D4767)

Triaxial Shear tests are used to determine the shear strength of soil samples under various loading conditions. A consolidated-undrained triaxial shear test was completed on a relatively undisturbed sample extruded from a Shelby tube. The data from this test was used in analyzing the shear strength parameters of the soil. Portions of the samples were placed in six (6) inch long tube molds and then subjected to deviator stresses at different confining pressures. The various confining pressures help determine the shear strength of the soil at different depths.

LABORATORY TEST RESULTS

The results of the laboratory testing are presented in the following tables.

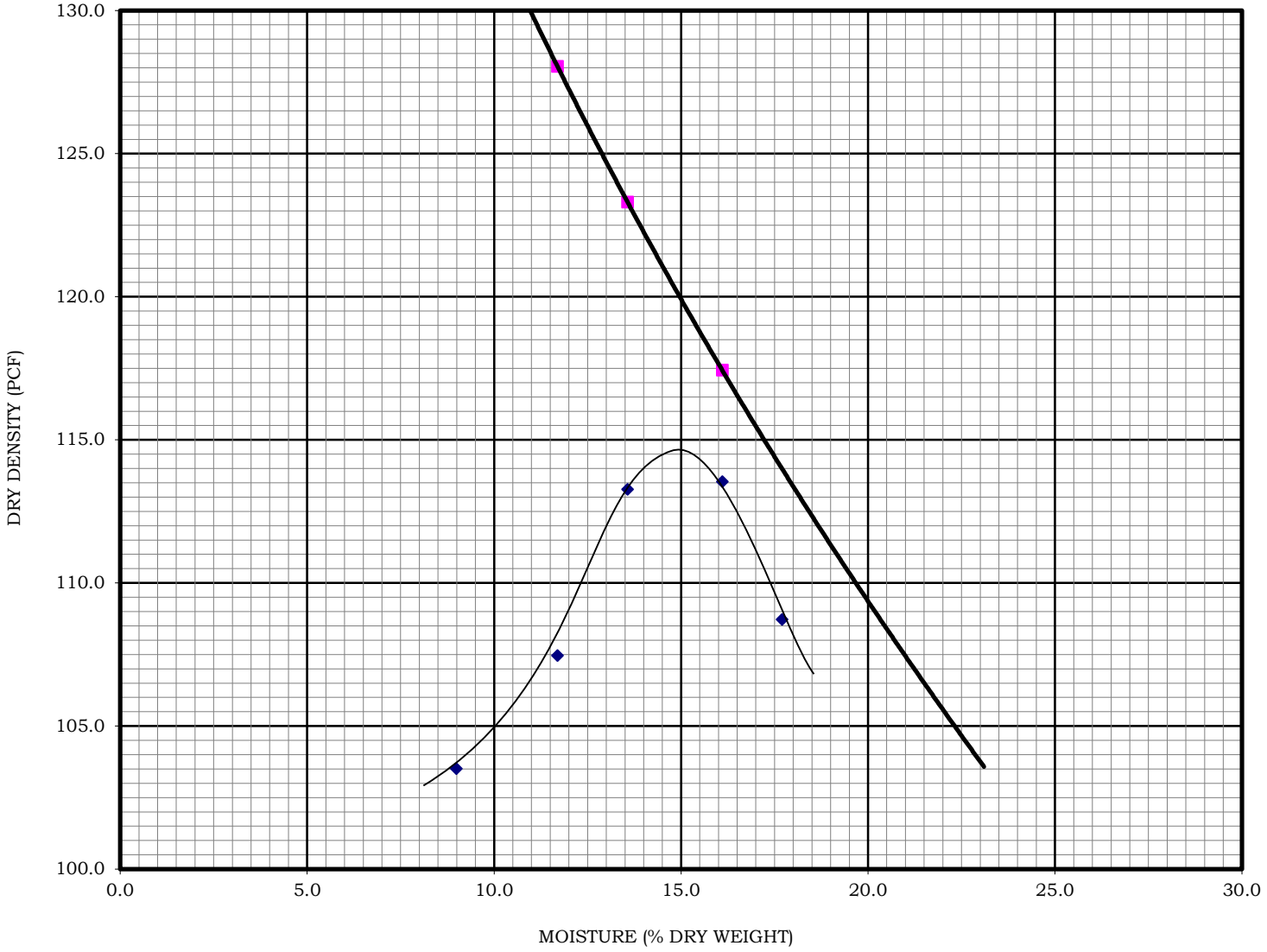
Boring or Test Pit Location	Sample Depth (ft)	LL	PL	PI	% Passing #200 Sieve	Moisture content (%)
B-01	8.5-10.0	--	--	--	--	29.8
B-03	6.0-7.5	--	--	--	27.9	13.2
B-03	18.5-20.2	NP	NP	NP	--	--
B-04	0.0-1.5	--	--	--	--	7.4
B-04	1.5-3.0	--	--	--	--	19.3
B-04	3.5-5.0	--	--	--	--	15.2
B-04	6.0-7.5	--	--	--	--	10.0
B-04	8.5-10.0	--	--	--	--	11.9
B-04	13.5-15.0	--	--	--	49.8	27.4
B-05	8.5-10.0	--	--	--	--	29.9
B-08	6.0-7.5	--	--	--	--	16.0
B-09	6.0-7.5	--	--	--	--	27.8
B-03 Bulk	15.0-25.0	--	--	--	48.8	--

Table A-1: General Soil Classification Test Results

Soils with a liquid limit (LL) greater than 50 and plasticity index (PI) greater than 25 usually exhibit significant volume change with varying moisture content and are considered to be highly plastic. Soils with a LOI value greater than 3 percent are usually not suitable for supporting building and pavement sections.

STANDARD PROCTOR TEST RESULTS

REPORT OF MOISTURE DENSITY RELATIONSHIP
ASTM D698 / D1557



Elev./ Depth	Classification AASHTO	Classification USCS	G_S	Natural Moisture	Liquid Limit	Plasticity Index	%< #200	%> 3/4 "	%> 3/8 "	%> #4

Sample Number: 312
Sample Description: brown clay w/sand
Sample Location:

Date received: 4/15/2017
Date tested: 4/17/2017
Date Issued: 4/17/2017

Test Results

Maximum Dry Density (PCF): 114.5
Optimum Moisture Content (%): 14.6

Project Name: GOODWIN HALL
Project Number: AU17037
Client / Contact:
Client Address:

Comments:

MTE Utilized: 06-9032, 06-9031, 06-9056

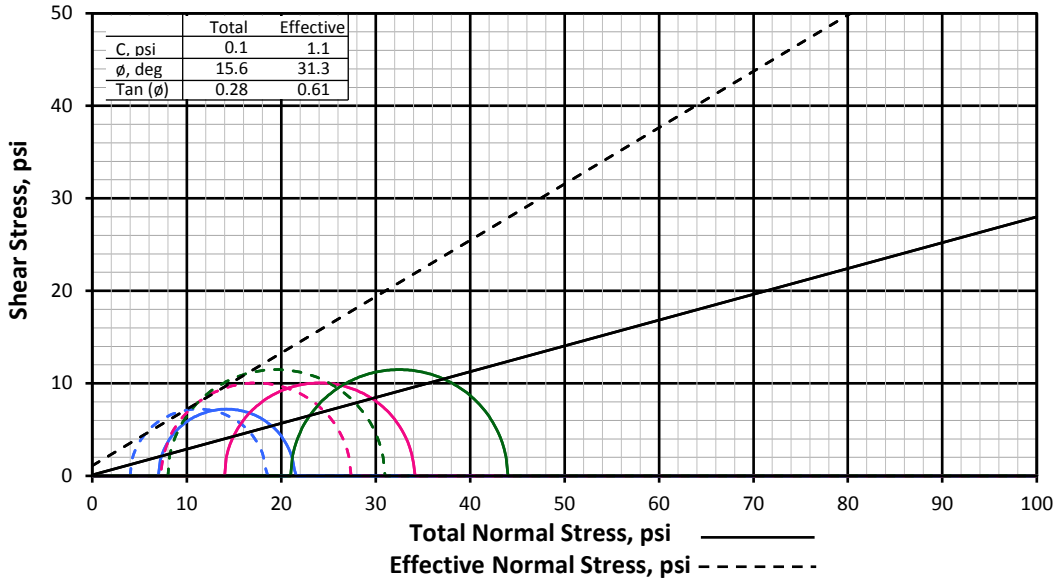
Test Type		Procedure	
"Standard" ASTM D 698	X	A	X
		B	
"Modified" ASTM D 1557		C	

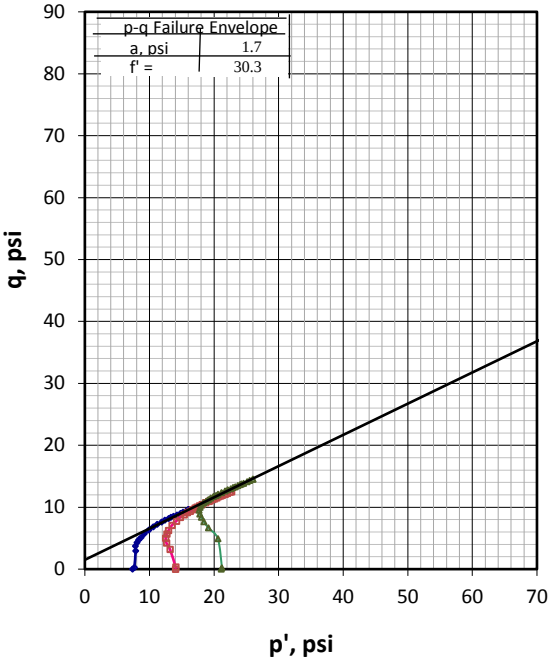
BUILDING & EARTH SCIENCES, LLP
5545 Derby Drive
Birmingham, Al 35210
Phone (205) 836-6300 / Fax (205)836-9007

* Other tests included (where applicable) were conducted in general accordance with the following ASTM Standards: D1140, and D4318. Specific Gravity was assumed

Approved by: Date:

TRIAXIAL TEST RESULTS





Sample No.		1	2	3
Initial	Water Content, %	14.6	14.6	14.5
	Dry Density, pcf	115.7	113.1	111.9
	Saturation, %	88	81.7	78.6
	Void Ratio	0.4456	0.4791	0.4943
	Diameter, in.	2.80	2.87	2.85
	Height, in.	6.10	5.95	6.10
At Test	Water Content, %	19.9	19.5	19.3
	Dry Density, pcf	109.0	109.9	110.2
	Saturation, %	100	100	100
	Void Ratio	0.5337	0.5215	0.5169
	Diameter, in.	2.88	2.02	2.88
	Height, in.	6.10	5.90	6.05
Strain rate, in./min.		0.0064	0.0064	0.0064
Back Pressure, psi		68.0	68.0	68
Cell Pressure, psi		75.0	82.0	89
Failure Total Stress, psi		21.4	34.1	44.0
Total Pore Pr., psi		71.4	75.6	79.7
Failure Dev. Stress, psi		14.4	20.1	23.0
Failure Stress Ratio		4.61	3.75	3.87
$\overline{\sigma_1}$ Failure, psi		18.4	27.4	31.0
$\overline{\sigma_3}$ Failure, psi		4.0	7.3	8

Type of Test: CU with Pore Pressures
Sample Type: Remolded
Description: REDDISH BROWN Silty, Clayey Sand (SC-SM)

Specific Gravity = 2.68
Remarks:

Client: AUFM

Project: Goodwin Hall Addition

Location: B-03, Bulk Sample
Sample No: 312 **Depth:** 15'-25'
Project No: AU17037 **Date:** 4/25/2017

BUILDING & EARTH
Geotechnical, Environmental, and Materials Engineers

TRIAXIAL SHEAR TEST REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.

B. See Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1. Comply with submittal requirements in Division 01 Section "Construction Waste Management and Disposal."

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing..
5. Protect items from damage during transport and storage.
6. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 024120 – SUPPORT OF FOUNDATION

SUMMARY

11.01 The specialty foundation contractor shall design and install excavation bracing and underpinning require to retain permanent excavations, and retain and support existing foundations for this project.

11.02 The specialty foundation contractor is solely responsible for design and construction of excavation bracing and underpinning. Review of submittals including calculations, designs, and shop drawings by the structural engineer does not relieve the contractor from responsibility.

11.03 Design and construction excavation of excavation bracing and underpinning shall be based on the following criteria:

- Geotechnical information per the report included in project manual drawings will be furnished upon request.
- Existing building drawings.
- Maximum existing building lateral deflection of ¼".
- Maximum existing building additional vertical settlements of ¼".
- Coordination with adjacent structure utilities.
- Temporary construction loads in accordance with ASCE 37-02 "Design loads on structures during construction."

11.04 Submit shop drawings and calculations stamped and signed by the foundation specialty engineer registered in the state of Alabama, including the following:

- Calculating
- Details, dimensions and schedules of all structural components.
- Master specifications.
- Installation and testing procedures.
- Product data and supporting reports for components and construction method not specifically covered by the building code.

11.05 Submit evidence of successful completion of at least five projects similar in concept and scope to the proposed foundation system.

11.06 Specialty foundation engineer shall perform periodic inspections of the work and submit confirming reports.

11.07 Prior to beginning work, contractor shall survey the condition of adjoining structures and submit record with photographs of any evidence of existing settlement or cracking.

11.08 Contractor shall provide periodic monitoring of existing building movement during construction.

12.01 Structural design of shoring walls shall be performed under the direct supervision of a professional engineer registered in Alabama. The drawings and calculations carrying the seal of the registered structural engineer shall be submitted for approval to the project architect. No excavation or construction of these walls shall begin until the drawings are approved. Design loads shall be

determined from the existing building drawings to be provided and also from the following loads, including but not limited to:

Note:

- Vehicular traffic at the top of the walls (see civil and arch. drawings)
- Pedestrian traffic at the top of the walls (see civil and arch. drawings)
- Surcharge soil and pavement loads (see civil and arch drawings)
- Mechanical units, transformers, or similar items and their pads (see hydrostatic mech., elec., plumbing, etc.)
- Hydrostatic loads
- Wind and seismic loads

12.02 Drainage behind shoring walls is the sole responsibility of the contractor and the design of his sub-contractors. If drainage behind or in front of the wall is required for the stability or proper design of these walls, it shall be shown in the shoring wall shop drawings and provided as a part of the project contract price by the general contractor.

12.03 Wall extents are shown on the structural, architectural and civil for this project.

12.04 Bottom and top elevations of walls given in the structural and civil drawings are approximate and do not include any required depth grade or footing for the walls. These items shall be inclined in the project scope and are per the requirements of the soil nail wall provider, in some instances (see drawings) details may show required depth below grade to coordinate with other construction in the project.

12.05 Contractor is responsible for safety and stability of wall and soil during construction.

12.06 Design and construction of these walls shall conform to the provisions of the applicable building codes.

12.07 Special inspector shall sample grout, soil properties, and any other materials used in construction of these walls.

6.21 12.08 Contractor shall survey plan and elevation locations of existing structures that may be located
next to these walls. Survey shall be conducted before construction, monthly during construction, and monthly after construction until all movement has ceased.

12.09 Coordinate shoring with other foundations.

Foundation Shoring note:

See Plan and details for anticipated / estimated locations of shoring for excavation and installation of new building foundations. Locations indicated are general concept only. Additional shoring/revised location of shoring may be required based on final shoring coordination, design, construction sequencing and construction means and methods. Design, installation and removal of shoring (if required) is the sole responsibility of the contractor. Design of shoring system shall be made by a qualified engineer licensed

in the state of Alabama. Contractor to submit stamped and signed design calculations and drawings. Shoring shall be designed for appropriate soil lateral loads, surcharges from adjacent structures, traffic surcharge loads, etc. Exact location of shoring to take into account new construction means and methods. Shoring location to be coordinated with wall formwork installation / removal, drilled pier installation, grade beam location, etc. Contractor to coordinate shoring with existing utilities. Copies of the geotechnical report are included in the project manual.

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Slabs-on-grade.
3. Concrete Toppings
4. Building Walls

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Field quality-control test and inspection reports.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

B. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn, galvanized.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C .

B. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Water: Potable.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products:
   a. Burke by Edoco; Aqua Resin Cure.
   b. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
   c. Euclid Chemical Company (The); Kurez DR VOX.
   d. Lambert Corporation; Aqua Kure-Clear.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than [4100 psi (29 MPa)] <Insert strength> at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than [5000 psi (34.5 MPa)] <Insert strength> at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.][Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:
1. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

C. Concrete Toppings: Proportion normal-weight concrete mixture as follows:
   1. Air Content: 5-1/2] percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

   1. [Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. [Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for[24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS – SEE SECTION 071910 VAPOR BARRIERS.

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturers recommended tape.

B. Granular Course: Cover vapor retarder with [granular fill] [fine-graded granular material], moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch (19 mm).

1. Place and compact a 1/2-inch- (13-mm-) thick layer of fine-graded granular material over granular fill.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls [as indicated] <Insert spacing>. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Clumps of mud and loose fill will not be allowed on slab pad.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.

1. Apply scratch finish to surfaces indicated to receive trowel finishconcrete floor toppings] [to receive mortar setting beds for bonded cementitious floor finishes] <Insert locations>.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces [indicated] [to receive trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer[unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project].

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least [one] [six] month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a [special inspector] [and] [qualified testing and inspecting agency] to perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Provide a minimum 24 hour notice to both MCPSS and Design Professional prior to placement.

2. Testing lab shall immediately notify Construction Project Manager, Design Professional and General Contractor of any test results that do not meet minimum test requirements as specified.

3. Notify Architect and MCPPS 24 hours in advance for a pre-pour inspection.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; [ASTM C 173/C 173M, volumetric method, for structural lightweight concrete;]one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
      b. Cast and field cure [two] <Insert number> sets of two standard cylinder specimens for each composite sample.
   7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
      b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
   8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
   9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing. For slab on grade, use FF=45/FL=35.

END OF SECTION

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete Masonry Units (CMU).
2. Face Brick.

B. See Division 5 Section "Metal Fabrications" for furnishing steel lintels for unit masonry.

1. See Division 7 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints for metal flashing.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

C. Samples for each type and color of exposed masonry units.

D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

1. For masonry units include material test reports substantiating compliance with requirements.

E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects.

1. Build sample panels for typical exterior wall in sizes approximately 48 inches long by 48 inches high.

1.4 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing

conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 COLORS, TEXTURES, AND PATTERNS

A. Exposed Masonry Units: Standard Running Bond CMU.

2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90.
1. Weight Classification: Normal weight unless otherwise indicated.

2.4 MASONRY LINTELS

A. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below. See plans for Cast Stone Lintels.

B. Masonry Lintels: Made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

2.5 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Brick shall match existing building. $450.00 per thousand Allowance.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

B. Hydrated Lime: ASTM C 207, Type S

C. Masonry Cement: ASTM C 91.

1. Mortar for Brick: (Match existing building). $13.00 a bag Allowance.

D. Mortar Pigments: Iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

E. Colored Cement Product: (Exterior Face Brick) Packaged blend made from portland cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

F. Aggregate for Mortar: ASTM C 144.

1. For joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

2. Colored Mortar Aggregate: Natural sand or crushed stone of color necessary top produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.7 REINFORCEMENT

I. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

J. Masonry Joint Reinforcement: ASTM A 951; mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.

1. Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
2. Multiwythe Masonry: (CMU and face brick).
   a. Adjustable (two-piece) type, with one side rod at each face shell of backing wythe and with ties that extend into facing wythe. Ties engage eyes or slots in reinforcement and extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face equal to HB Lox All Adjustable Eye-Wire.
3. Drywall Construction with Metal Studs: HB X Seal Anchor.

2.8 TIES AND ANCHORS

A. Materials:

4. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

6. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2.9 EMBEDDED FLASHING MATERIALS

A. Flashing:
1. For all flashing use T304 stainless steel at 26-gauge thickness.
2. All flashing splices must be covered with a third piece of flashing fully bedded in medium modulus silicone such as Dow 795, Tremco Spectrum 2, Pecora 895, or an engineer approved equal.
3. Always carry through-wall flashing out of masonry veneer face, exposing edge to allow best drainage.
4. Do not fasten window heads up through shelf angles.
5. Dampproof all backup-walls, block masonry, sheathing, etc.
6. Flashing must transition up behind dampproofing.
7. All stainless steel flashing must be end dammed at termination between through wall flashing and dissimilar systems.
8. Through wall flashing consist of a stainless steel pan and 40 mil thick asphalt modified waterproofing membrane from manufacturers such as WR Grace, Ploygaurd, Carlisle, or approved equal. These membranes must be terminated on the stainless steel pan a minimum 1” back from the face of the exterior masonry wall. Termination of the membrane at the dampproofed backup wall must occur 8” above the mortar net drainage medium, or approximately 16” above the shelf angle. Use a stainless steel termination bar, ¾” wide by 1/8” thick anchored at 8” on center to terminate membrane at dampproofing sheathing. Lap seal termination bar with trowel grade dampproofing.
9. For masonry cavities at all through wall flashings use Dur-A-Cell vents or an engineer approved equal.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from urethane.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use the following, unless otherwise indicated:

1. Mortar Net Weep Vent

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, maximum.

3.2 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

E. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.4 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:
1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit insulation between wall ties and other confining obstructions, with edges butted tightly. Press units firmly against inside wythe of masonry.

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL MEMBERS (if applicable)

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as indicated, but not more than 16 inches o. c. vertically and 32 inches o. c. horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

3.9 FIELD QUALITY CONTROL

A. Inspectors: Contractor will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

C. The contractor shall be responsible for mortar sampling and testing, and inspection to conform compliance to the Drawings and Specifications. The Owners agency conducts visual inspections to check waterproofing materials and the Contractor's field quality control measures.

3.10 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.11 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
2. Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.
3. The owner will employ and pay for services of an independent laboratory to perform specified inspecting and testing. General Contractor is responsible for contacting lab to perform testing. Obtain four samples of face brick and cmu units and test for conformance to ASTM C67.

END OF SECTION 04810

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

I) RELATED DOCUMENTS:
- A) Drawings and general provisions of Contract, including General and Supplementary
- B) Conditions and Division 1 Specification Sections, apply to this Section.

II) Related work specified elsewhere includes:
- A) Section 03310 - "Concrete"
- B) Section 05210 - "Steel Joists"
- C) Section 05500 - "Metal Fabrications"
- D) Section 06100 - "Rough Carpentry"

III) DESCRIPTION OF WORK
- A) Work described in this section includes structural steel work. Structural steel is that
- B) work defined in AISC "Code of Standard Practice" and otherwise shown on drawings.

IV) QUALITY ASSURANCE
- A) Codes and Standards:
- B) Comply with provisions of following, except as otherwise indicated:
    1) AISC "Code of Standard Practice for Steel Buildings and Bridges".
    2) Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings".
    3) AISC "Specifications for the Design, Fabrication and Erection of
    4) Structural Steel for Buildings", including the "Commentary" and
- C) Supplements thereto as issued.
    1) AISC "Specifications for Structural Joints Using ASTM A 325 or A 490Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
    2) AWS D1.1 "Structural Welding Code".
    3) ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates,
- D) Shapes, Sheet Piling and Bars for Structural Use".
    1) Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedures". Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within previous 12 months. If recertification of welders is required, retesting will be Contractor's responsibility.

V) SUBMITTALS

A) Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
B) Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
C) High-strength bolts (each type), including nuts and washers.
D) Structural steel primer paint.
E) Shrinkage-resistant grout.

VI) Shop Drawings:

A) Submit shop drawings prepared under supervision of registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
B) Include details of cuts, connections, camber, holes and other pertinent data.
C) Indicate welds by standards AWS symbols, and show size, length, and type of each weld.
D) Provide setting drawings, templates and directions for installation of anchor bolts and other anchorages to be installed by others.

VII) DELIVERY, STORAGE AND HANDLING

A) Deliver anchor bolts and anchorage devices, which are to be embedded in cast-inplace concrete or masonry, in ample time to not delay that work.
B) Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
C) Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
D) Refer to Division 1 Sections "Summary of Work" and "Special Conditions" for additional information and requirements regarding stored materials.

PART 2 – PRODUCTS

I) 2.1 MATERIALS

A) Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B) Structural Steel Shapes, Plates and Bars: ASTM A 36, except where other type steel is indicated.
C) W and WT Shapes: ASTM A992, Grade 50, unless otherwise indicated on Structural Drawings.
D) Cold-Formed Steel Tubing: ASTM A 500, Grade B.
E) Hot-Formed Steel Tubing: ASTM A 501, Grade B.
F) Steel Pipe: ASTM A 53, Type E or S, Grade B.
G) Finish: Black, except where indicated to be galvanized.
H) Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
I) Anchor Bolts: ASTM A 307, non-headed type unless otherwise indicated.
J) High-Strength Threaded Fasteners:
    1) Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
    2) Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.
    3) Direct tension indicator washers may be used at Contractor's option.
K) Electrodes for Welding: Comply with AWS Code.
L) Structural Steel Primer Paint: Southern Coatings "Heavy Duty RIP Primer 1 0900",
M) Tnemec "10-99 Primer", or preapproved equivalent.
N) Verify that primer is 100% and fully compatible with any sprayed-on fireproofing product intended for use. Notify Architect immediately in writing of any related problems.
O) Non-Metallic Shrinkage-Resistant Grout:
P) Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-621.
Q) Products offered by manufacturer to comply with requirements for non-metallic, non-shrink grout include the following:
    1) Euco N.S.; Euclid Chemical Company
    2) Crystex; L & M Construction Chemicals.
    3) Masterflow 713; Master Builders.
    4) Five Star Grout; U.S. Grout Corp.
    5) Upcon; Upco Chemical Division, USM Corp.
    6) Propak; Protex Industries, Inc.

II) 2.2 FABRICATION

A) Shop Fabrication and Assembly:
    1) Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specification and as indicated on final shop drawings. Provide camber in structural members where indicated.

2) Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
3) Where finishing is required, complete assembly, including welding of units, before start of finish operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B) Connections:
1) Weld or bolt shop connections, as indicated.
2) Bolt field connections, except where welded connections or other connections are indicated. Use high-strength threaded fasteners.
3) High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" (RCRBSJ).

C) Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

D) Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

E) Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

F) Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

III) 2.3 SHOP PAINTING

A) General:
1) Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.
2) Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.
3) Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
4) Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
(a) SP-1 "Solvent Cleaning", followed by SP-3 "Power Tool Cleaning".

5) Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry film thickness of 2.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces. Apply 2nd coat paint in accordance with manufacturers instructions and at a rate to provide a uniform dry film thickness of 7.5 mils. Provide total uniform dry film thickness of 10 mils.

PART 3 – EXECUTION

I) INSPECTION

A) Erector must examine areas and conditions under which structural steel work is to be installed, and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until satisfactory conditions have been corrected in a manner acceptable to the Erector.

II) 3.2 ERECTION

A) Surveys: Employ a registered professional engineer or land surveyor, experienced in survey work, to establish permanent bench marks as shown and as necessary for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

B) Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C) Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

D) Anchor Bolts:
   1) Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
   2) Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate location.
   3) Refer to Division 3 of these specifications for anchor bolt installation requirements in concrete, and Division 4 for masonry installation.

E) Setting Bases and Bearing Plates:
   1) Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

2) Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
3) Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
4) Pack grout solidly between bearing surfaces and bases of plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

F) Field Assembly:
1) Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2) Level and plumb individual members of structure within specified AISC tolerances.
3) Splice members only where indicated and accepted on shop drawings.

G) Erection Bolts:
1) On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
2) Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
3) Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

H) Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

I) Touch-Up Painting:
1) Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint. Apply paint to exposed areas with same material as used for shop painting.
2) Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

III) 3.3 FIELD QUALITY CONTROL

A) An independent testing and inspection agency shall inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

B) Refer to Section 01015 - "Special Conditions" for additional information and requirements.
C) Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
D) Contractor shall provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
E) Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
F) Contractor shall correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Additional tests as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work will be performed at Contractor's expense.
G) Shop Bolted Connections: Inspect in accordance with AISC specifications.
H) Shop Welding:
    1) Inspect during fabrication of structural steel assemblies, as follows:
        (a) Certify welders and conduct inspections as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
        (b) Perform visual inspection of all welds.
I) Field Bolted Connections: Inspect in accordance with AISC specifications.
J) Field Welding:
    1) Inspect during erection of structural steel as follows:
    2) Certify welders and conduct inspections as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
    3) Perform visual inspection of all welds after welding, and again after cleaning and re-priming.

END OF SECTION

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist accessories.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for installing bearing plates in concrete.

1.3 DEFINITIONS

A. SJI "Specifications" : Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

B. Design joists to withstand design loads with live load deflections no greater than the following:

1. Floor Joists: Vertical deflection of 1/360 of the span.

1.5 SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.

B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.

1. Indicate locations and details of bearing plates to be embedded in other construction.
2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

C. Welding certificates.

D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.

E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.

F. Qualification Data: For manufacturer and professional engineer.

G. Field quality-control test and inspection reports.

H. Research/Evaluation Reports: For joists.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Deliver steel bearing plates to be built into cast-in-place concrete construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.

B. Steel Bearing Plates: ASTM A 36/A 36M.

C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

E. Welding Electrodes: Comply with AWS standards.

2.2 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.3 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

D. Provide holes in chord members for connecting and securing other construction to joists.

E. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

F. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

G. Camber joists according to SJI's "Specifications."

2.4 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Fabricate as indicated and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

D. Steel bearing plates with integral anchorages are specified in Division 05 Section "Metal Fabrications."

E. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

F. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

D. Shop priming of joists and joist accessories is specified in Division 09 painting Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Field welds will be visually inspected according to AWS D1.1/D1.1M.

C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:

1. Radiographic Testing: ASTM E 94.
2. Magnetic Particle Inspection: ASTM E 709.
3. Ultrasonic Testing: ASTM E 164.
4. Liquid Penetrant Inspection: ASTM E 165.

D. Bolted connections will be visually inspected.

E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."

F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

SECTION 053100 – STEEL DECKING

PART 1 – GENERAL

I) RELATED DOCUMENTS

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

B) SUMMARY

1) This Section includes the following, at locations indicated on the Drawings:

(a) Composite Floor Deck

C) Related Sections include the following:

1) Division 3 Section "Concrete" for concrete fill and reinforcing steel.
2) Division 5 Sections "Structural Steel" and "Steel Joists" for supporting structure.
3) Division 5 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4) Division 9 Section "Painting" for repair painting of any painted deck.

D) Finish painting of all exposed steel is specified in Division 9 Section "Painting", not the work of this Section.

II) SUBMITTALS

A) Product Data: For each type of deck, accessory, and product indicated.

B) Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C) Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.

D) Welding Certificates: Copies of certificates for welding procedures and personnel.

E) Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products.

F) Research/Evaluation Reports: Evidence of steel deck's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

III) QUALITY ASSURANCE

A) Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B) Refer to Division 1 Section "Special Conditions", for additional information and minimum experience requirements.

C) Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D) Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."

E) AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

F) FM Listing: Provide steel roof deck evaluated by FM and listed in FM's "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

IV) DELIVERY, STORAGE, AND HANDLING

A) Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B) Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

C) Refer to Division 1 Sections "Summary of Work" and "Special Conditions", for additional information and requirements regarding stored materials.

PART 2 – PRODUCTS

I) MANUFACTURERS

A) Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Galvanized Steel Deck:

(a) BHP Steel Building Products USA Inc.
(b) Consolidated Systems, Inc.
(c) Epic Metals Corp.
(d) Marlyn Steel Products, Inc.
(e) Nucor Corp.; Vulcraft Div.
(f) Roof Deck, Inc.
(g) United Steel Deck, Inc.
(h) Verco Manufacturing Co.
(i) Vulcraft Division; Nucor Corporation.
(j) Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.

II) COMPOSITE FLOOR DECK

A) Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1) Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
2) Profile Depth: 3 inches (76 mm)
3) Design Uncoated-Steel Thickness: 0.0474 inch (1.52 mm).
4) Span Condition: As shown on plans.

III) COMPOSITE ROOF DECK

A) Composite Roof Deck: 1-1/2" 22 gage wide rib roof deck.

IV) ACCESSORIES

A) General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

1) Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbonsteel screws, No. 10 (4.8 mm) minimum diameter.
2) Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
3) Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm)

design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

4) Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
5) Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile indicated, or if not indicated, recommended by SDI Publication No. 29 for overhang and slab depth.
6) Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
7) Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) at roof and form deck, and 0.0747 inch (1.90 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter, unless otherwise indicated on Structural Drawings.
8) Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and level or sloped recessed pans, as indicated or otherwise required by project conditions, of 1-1/2-inch (38- mm) minimum depth. For drains, cut holes in the field.
9) Shear Connectors (if any): ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.
10) Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 – EXECUTION

I) EXAMINATION

A) Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

II) INSTALLATION, GENERAL

A) Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.
B) Install temporary shoring before placing deck panels, if required to meet deflection limitations.
C) Locate decking bundles to prevent overloading of supporting members.
D) Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
E) Place deck panels flat and square and fasten to supporting frame without warp or deflection.
F) Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.
G) Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
H) Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

III) 3.4 FLOOR DECK INSTALLATION

A) Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows, unless otherwise indicated on Structural
B) Drawings:
    1) Weld Diameter: 3/4 inch (19 mm) nominal, unless otherwise indicated on Structural Drawings, or larger diameter is required to comply with applicable codes, standards, and load requirements.
C) Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart, unless otherwise indicated on Structural Drawings, or larger diameter is required to comply with applicable codes, standards, and load requirements.
D) Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 2 of the span or 36 inches (910mm), and as follows, unless otherwise indicated on Structural Drawings.
E) Mechanically fasten with self-drilling No. 10 (4.8-mm-) diameter or larger carbonsteel screws, or with a minimum of 1-1/2-inch- (38-mm-) long welds, as indicated.
F) End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
G) End Joints:
    1) Non-Composite Deck: Lapped.
H) Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
I) Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends ofribs and sides of decking.
J) Weld cover plates at changes in direction of floor deck panels,unless otherwise indicated.

IV) 3.5 FIELD QUALITY CONTROL

A) Testing: The Owner will engage a qualified independent testing agency to perform field quality-control testing.
B) Refer to Division 1 Section “Special Conditions” for additional information and requirements regarding testing.
C) Field welds will be subject to inspection.
D) Testing agency will report test results promptly and in writing to Contractor, Structural Engineer, and Architect, but no more than five days after any individual testing requirements have been performed.
E) Remove and replace work that does not comply with specified requirements.
F) Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance of corrected work with specified requirements.

V) REPAIRS AND PROTECTION

A) Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer’s written instructions.
B) Wire brush and clean rust spots, welds, and abraded areas on both surfaces of deck immediately after installation, and apply repair paint.

C) Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054000 COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior load-bearing wall framing.
2. Interior load-bearing wall framing.
3. Exterior non-load-bearing wall framing.

B. Related Sections include the following:

1. Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on structural drawings.

2. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
3. Design framing system to maintain clearances at openings, and to allow for construction tolerances.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For testing agency.

E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. AllSteel Products, Inc.
2. Clark Steel Framing.
3. Dietrich Metal Framing; a Worthington Industries Company.
4. MarinoWare; a division of Ware Industries.

2.2 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows (unless noted otherwise on structural drawings):

1. Minimum Base-Metal Thickness: As indicated on structural drawings.

2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on structural drawings..
2. Flange Width: 1-1/4 inches.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on structural drawings.
2. Flange Width: 1-5/8 inches.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch.
2. Flange Width: 1-1/4 inches.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts or headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 7 Section "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 32 inches.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced 48 inches. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

E. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.6 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.
END OF SECTION 05400

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Prefabricated building columns.
3. Shelf angles.
4. Miscellaneous steel trim.
5. Aluminum Ladders
6. Metal bollards.
7. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

B. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS (If Applicable or indicated on drawings)

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

E. Steel Tubing: ASTM A 500, cold-formed steel tubing.

F. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

G. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

2.3 NONFERROUS METALS (If applicable or indicated on drawings)

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

C. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).

D. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

E. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.4 FASTENERS (If applicable or indicated on drawings)

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or

ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

2.5 MISCELLANEOUS MATERIALS (If applicable or indicated on drawings)

A. Shop Primers: Provide primers that comply with Division 09 painting Sections.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches o.c.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS (If applicable or indicated on the drawings)

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

D. Aluminum Ladders:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis of Design: Precision Ladders LLC Super Simplex Disappearing Stairway with Deep Design Box.(One-Hour Rated).

3. ACL Industries, Inc.
   a. Alco-Lite Industrial Products.
   b. Halliday Products.
   c. O'Keeffe's Inc.
   d. Royalite Manufacturing, Inc.
   e. Thompson Fabricating, LLC.

2.8 MISCELLANEOUS STEEL TRIM (If applicable or indicated on drawings).

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize exterior miscellaneous steel trim.

2.9 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe 1/4-inch wall-thickness rectangular steel tubing in size indicated on drawings.

1. Cap bollards with 1/4-inch thick steel plate.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch thick steel plate welded to bottom of sleeve.

C. Prime bollards with zinc-rich primer.

2.10 LOOSE BEARING AND LEVELING PLATES (If applicable or indicated on drawings)

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.11 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Galvanize loose steel lintels located in exterior walls.

2.12 STEEL WELD PLATES AND ANGLES (If applicable or indicated on drawings)

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is are indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards in concrete formed or core-drilled holes. Fill annular space around bollard solidly with nonshrink, nonmetallic grout.

C. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

D. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
b. Infill load and other loads need not be assumed to act concurrently.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, local manufacturers offering products may be incorporated into the Work.

2.2 METALS, GENERAL

A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Provide the following:
   1. Hot-Dip Galvanized Railings: Type or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Shop Primers: Provide primers that comply with Division 09 painting Sections.

F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

G. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

H. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

I. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

J. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

K. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

E. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

F. Form changes in direction by bending.

G. Bend members in jigs to produce uniform curvature without buckling or otherwise deforming exposed surfaces.

H. Close exposed ends of railing members with prefabricated end fittings.

I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers to transfer loads through wall finishes.

2.6 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.

B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Anchor posts in concrete by inserting into formed or core-drilled holes and grouting annular space.

D. Anchor posts to metal surfaces with oval flanges.

E. Anchor railing ends at walls with round flanges anchored to wall construction.

F. Attach railings to wall with wall brackets, except where end flanges are used. Use type of

G. Secure wall brackets and railing end flanges to building bracket predrilled hole for exposed bolt anchorage. Construction as follows: (Where Applicable or Indicated on Drawings)

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055213

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.

B. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corporation.
2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.2 ROOF SHEATHING

A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

1. Span Rating: Not less than 16/0.
2. Nominal Thickness: Not less than 5/8 inch.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch (0.8 mm).

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.
c. MFM Building Products Corp.; Window Wrap.
d. Polyguard Products, Inc.; Polyguard 300.
e. Protecto Wrap Company; PS-45.

C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior standing and running trim.
2. Wood cabinets.
3. Plastic-laminate cabinets.
4. Plastic-laminate countertops.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Product Data: For cabinets, hardware and accessories finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:
1. Plastic-laminates, for each type, color, pattern, and surface finish.

D. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

A. Wood Products:
   1. Hardboard: AHA A135.4.
   2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
   3. Particleboard: (If applicable) ANSI A208.1, Grade M-2.
   4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1**,** made with adhesive containing no urea formaldehyde.

B. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Formica Corporation.
      b. Nevamar Company, LLC; Decorative Products Div.
      c. Wilsonart International; Div. of Premark International, Inc.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening**,** self-closing.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal4 inches long, 5/16 inch in diameter 2-1/2 inches deep.

E. Catches: Ball friction catches, BHMA A156.9, B03013.

F. Drawer Slides: BHMA A156.9, B05091.
   1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated steel ball-bearing slides.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Stainless Steel: BHMA 630.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.5 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

   1. Interior Woodwork Grade: Custom.
   2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Interior Standing and Running Trim:

   1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
   2. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
   3. Assemble casings in plant except where limitations of access to place of installation require field assembly.

C. Wood Cabinets for Painted Finish:

   1. AWI Type of Cabinet Construction: As indicated.
   2. WI Construction Type: multiple self-supporting units rigidly joined together openings].
   3. Species for Exposed Lumber Surfaces: Birch.
   4. Semi exposed Surfaces: Match materials indicated for exposed surfaces.

D. Plastic-Laminate Cabinets:

   1. AWI Type of Cabinet Construction: Flush Overlay.
   2. Reveal Dimension: 1/2 inch**.**
   3. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:

      a. Horizontal Surfaces Other Than Tops: Grade HGS.
      b. Post formed Surfaces: Grade HGP.

c. Vertical Surfaces: Grade HGS.
d. Edges: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.

4. Materials for Semi exposed Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
5. Drawer Sides and Backs: Thermoset decorative panels.
6. Drawer Bottoms: Thermoset decorative panels.
7. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors.

E. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS.
2. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces.

2.6 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

C. Paint Finish:

1. Grade: Premium.
2. Color: As selected from manufacturer's full range.
3. Sheen: Semi gloss.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 071910 UNDER-SLAB VAPOR BARRIER

PART 1 – GENERAL

1.1 SUMMARY

A. Products supplied under this section:
   1. 10 Mil Vapor barrier, seam tape, and mastic for installation under concrete slabs.

B. Related sections:
   1. Section 033000 Cast-in-Place Concrete

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
   2. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
   3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
   4. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
   5. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):
   1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.3 SUBMITTALS

A. Quality control/assurance:
   1. Summary of test results as per paragraph 8.3 of ASTM E 1745.
   2. Manufacturer’s samples, literature.
   3. Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vapor barrier must have all of the following qualities: Basis of Design – Stego Wrap Claas A Vapor Retarder

a. ASTM E1745 Class A.
b. Tensile Strength: ASTM D882.
c. Thickness: 10 mils minimum.
d. Permeance: ASTM 1249.
e. Puncture Resistance: ASTM D1709.

B. Approved Manufacturers of Vapor Barrier products:
1. W. R. Meadows.
2. Viper 2 10 mil.
3. Raven Industries Vapor Block 10.
4. Tex-Trude XP Xtreme.

2.2 ACCESSORIES

A. Seam tape:
1.Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com. Or equal.

B. Vapor-proofing mastic:
1.Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.Or equal.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that base material is approved by Architect or Geotechnical Engineer.
1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643.
1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
2. Lap vapor barrier over footings and/or seal to foundation walls.
3. Overlap joints 6 inches and seal with manufacturer's tape.
4. Seal all penetrations (including pipes) per manufacturer's instructions.
5. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

End of Section

SECTION 072726 - FLUID-APPLIED MEMBRANE AND VAPOR AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fluid-applied membrane air barrier, vapor retarding.

1.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding, air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, including installation instructions, use limitations and substrate preparation recommendations.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1. Include details of interfaces with other materials that form part of air barrier.

C. Product certificates.

D. Qualification data.

E. Product test reports.

Samples: Submit representative samples of the following approval:
1. Fluid applied air barrier membrane.
2. Transition membrane.
3. Through wall flashing.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials 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. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly, 8' long x 8' wide, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
2. Include junction with roofing membrane, building corner condition and foundation wall intersection.

C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANES

A. GENERAL: For each type of material required for the work of this section, provide primary materials that are the product of one manufacturer.

B. FLUID APPLIED MEMBRANES

1. Description: A two part, self-curing, synthetic rubber based material free of solvents, isocyanates and bitumen.

2. Performance Requirements:

Property	**Test Method**	**Typical Value**
Color		Green
Cured Film Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Solids Content	ASTM D 1644	100%
Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2178	<0.001 L/(s.m^2) (<0.0002 cfm/ft^2)
Assembly Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2357	<0.004 L/s*m^2 (<0.0008 cfm/ft^2)
Water Vapor Permeance	ASTM E 96, Method BW	Less than 4.6 ng/Pa.s.m^2 (0.08 Perms)
Pull Adhesion to Concrete Block (CMU)	ASTM D 4541-02	0.24 N/mm² (35 psi)
Pull Adhesion to Glass Faced Wall Board	ASTM D 4541-02	0.12 N/mm² (18 psi)

Peel Adhesion to Concrete	ASTM D 903 Modified[1]	880 N/m (5 lb./in.)
Elongation	ASTM D 412	500% minimum
Pliability, 180° Bend over 25 mm (1 in.) Mandrel at -30°C (-23°F)	ASTM D 1970	Unaffected
Low Temperature Flexibility and Crack Bridging 3.2mm (1/8in.) crack cycling at –26°C (-15°F)	ASTM C836	Pass
Extensibility over 6.4mm (1/4in.) crack after heat aging	ASTM C836	Pass

Footnote:

a. The membrane is applied to concrete and allowed to cure. Peel adhesion of the membrane is measured at a rate of 50 mm (2 in.) per minute with a peel angle of 90° at room temperature.

3. Acceptable Materials:
   a. Perm-A-Barrier ® Liquid from Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA, or approved equal.
   b. Sto Guard Systems – Vapor Seal , Trade name- Sto Guard by Sto Corp, 3800 Camp Creek, Atlanta, GA.
   c. Perminator 15 mil by W.R. Meadows, Inc.

Note: Where Grace Products are shown as the basis of design products in the drawings, Sto Guard Components meeting the specification requirements are approved as equal components.

C. TRANSITION MEMBRANE

1. Description: 0.9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mil) of cross-laminated, high-density polyethylene film to provide a min. 0.1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
2. Performance Requirements:

   a. Water Vapor Transmission: ASTM E 96, Method B: 2.9 ng/m2sPa (0.05 perms) max.

   b. Air Permeance at 75Pa (0.3 in. water) pressure difference: 0.0006 L/(s.m^2) (0.00012 cfm/ft^2) max.

   c. Puncture Resistance: ASTM E 154: 178 N (40 lbs.) min.

   d. Lap Adhesion at –4°C (25°F), ASTM D 1876: 880 N/m (5.0 lbs./in.) of width min.

   e. Low Temperature Flexibility, ASTM D 1970: Unaffected to –43°C (-45°F).

   f. Tensile Strength, ASTM D 412, Die C Modified: min. 2.7 MPa (400 psi)

   g. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D 412 Die C: min. 200%.

3. Acceptable Materials: Perm-A-Barrier Detail Membrane manufactured by Grace Construction Products.

D. FLEXIBLE MEMBRANE THROUGH WALL FLASHING

1. Description: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

2. Performance Requirements:
   a. Water Vapor Transmission, ASTM E 96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
   b. Water Absorption, ASTM D 570: Max. 0.1% by weight.
   c. Puncture Resistance, ASTM E 154: 356N (80 lbs.) min.
   d. Tear Resistance
      1.) Initiation ASTM D 1004: Min. 58 N (13.0 lbs.) M.D.
      2.) Propagation ASTM D1938: Min. 40 N (9.0 lbs.) M.D.
   e. Lap Adhesion at-4ºC (25ºF), ASTM D 1876: 880 N/m (5.0 lbs./in.) of width.
   f. Low Temperature Flexibility, ASTM D 1970: Unaffected to -43ºC (-45ºF).
   g. Tensile Strength, ASTM D 412, Die C Modified: Min. 5.5 MPa (800 psi).
   h. Elongation, Ultimate Failure of Rubberized Asphalt D412, Die C: Min. 200%

3. Acceptable Materials: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products, or approved equal.

2.2 AUXILIARY MATERIALS

A. Description: Water-based primer which imparts an aggressive, high tack finish on the treated substrate:

1. Flash Point: No flash to boiling point.
2. Solvent Type: Water.
3. VOC Content: Not to exceed 10 g/l.
4. Application Temperature: -4ºC (25ºF) and above.
5. Freezing point (as packaged): -7ºC (21ºF).

Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products, or approved equal.

B. Description: Two-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/l max. VOC Content.

Product: Bituthene ® Liquid Membrane manufactured by Grace Construction Products, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied waterproofing.

B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 50-75mm (2-3 in.) wide, reinforced self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied membrane.

C. Masonry Substrates: Apply air and vapor barrier over concrete block and brick with smooth flush mortar joints. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.

D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.

3.3 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation.

B. Application of Fluid Applied Membrane:

1. Spray or trowel apply a continuous uniform film at min. 60 mils (1.5 mm or .060 in.) dry film thickness using multiple, overlapping passes.
2. When spraying use a cross-hatching technique (alternating horizontal and vertical passes) to ensure even thickness and coverage.
3. When spraying use high pressure, multi-component, airless spray equipment approved by material manufacturer.
4. Carry membrane into any openings a minimum of 50 mm (2 in.).
5. Seal all brick-ties and other penetrations as work progresses.

C. Application of Transition Membrane:

1. After allowing the Fluid Applied Membrane to cure to tack-free, apply transition membrane with a minimum overlap of 75mm (3 in.) onto each surface at all beams, columns and joints as indicated in detail drawings.

2. Tie in to window and door frames, spandrel panels, roof and floor intersections and changes in substrate.
3. Use pre-cut, easily handled lengths for each location.
4. Remove silicone-coated release paper and position membrane flashing carefully before placing it against the surface.
5. When properly positioned, place against surface by pressing firmly into place by hand roller.
6. Overlap adjacent pieces 50 mm (2 in.) and roll all seams with a hand roller.
7. Seal top edge of flashing with termination mastic.
8. When transition flashing is pre-installed prior to application of Fluid Applied Membrane, apply transition flashing as above. Spray or trowel a continuous uniform film of Fluid Membrane at min. 60 mils (1.5 mm or .060 in.) dry film thickness using multiple, overlapping passes, with a minimum overlap of 75 mm (3 in.) onto transition flashing. For sill condition, spray or trowel Fluid Membrane onto pre-installed sill flashing and onto horizontal section of sill.

D. Application of Flexible Membrane Wall Flashing:

1. Precut pieces of flashing to easily handled lengths for each location.
2. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
3. When properly positioned, place against surface by pressing firmly into place by hand roller. Fully adhere flashing to substrate to prevent water from migrating under flashing.
4. Overlap adjacent pieces 50 mm (2 in.) and roll all seams with a hand roller.
5. Trim bottom edge 13mm (1/2 in.) back from exposed face of the wall. Flashing shall not be permanently exposed to sunlight.
6. At heads, sills and all flashing terminations, turn up ends a minimum of 50 mm (2 in.) and make careful folds to form an end dam, with the seams sealed.
7. Seal top edge of flashing with termination mastic.
8. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with poly-sulfide sealants, creosote, uncured coal tar products or EPDM.

3.4 PROTECTION AND CLEANING

A. Remove any masking materials after installation. Clean any stains on materials that would be exposed in the completed work using procedures as recommended by manufacturer.

B. Perm-A-Barrier Liquid is not suitable for permanent exposure and should be protected from the effects of sunlight.

C. Schedule work to ensure that the Perm-A-Barrier Liquid system is covered as soon as possible after installation. Protect Perm-A-Barrier Liquid system from damage during subsequent operations. If the Perm-A-Barrier Liquid system cannot be covered within 60 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION 072726

SECTION 071326 - SHEET MEMBRANE WATERPROOFING

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I Specification sections apply to this section.

1.2 SUMMARY

A. This Section includes self-adhesive rubberized asphalt sheet membrane waterproofing systems, drainage composites, accessories and related materials, including the following:

1. Foundation/Basement Wall.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. C 366 - Standard Test Methods for Measurement of Thickness of Sandwich Cores.
2. C 836 - Standard Specification for High Solids, Cold Liquid-Applied Elastomeric.
3. Waterproofing Membrane for Use with Separate Wearing Course.
4. D 412 - Standard Test Methods for Rubber Properties in Tension.
5. D 570 - Standard Test Method for Water Absorption of Plastics.
6. D 882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
7. D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
8. D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
9. D 1876 - Standard Test Method for Peel Release of Adhesives (T-Peel).
10. D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
11. D-3767 Method A - Standard Practice for Rubber-Measurement of Dimensions.
12. D-3776 - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
13. D-4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
14. D-4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
15. D-4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
16. D-4716 - Standard Test Method for Constant Head Hydraulic Transmissivity (In 0 Plane Flow) of Geotextiles and Geotextile Related Products.
17. D-4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
18. D-4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
19. E-96 - Standard Test Methods for Water Vapor Transmission of Materials.
20. E-154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.4 SYSTEM DESCRIPTION

B. Composite Sheet Membrane waterproofing products and related accessories produced and installed to establish and maintain watertight continuous seals and conditions and to establish single source responsibility for integrity of entire waterproof system.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Product data and general recommendations from waterproofing materials manufacturer for types of waterproofing required.

C. Samples, 6”x6” of composite sheet membrane waterproofing, drainage core, tapes, fasteners and auxiliary materials as requested by the Design Professional.

D. Quality Control Submittals: Submit data sheets indicating tensile strength, puncture resistance, permeability, elongation and water migration, as verified by independent testing laboratories.

1. Manufacturer's Field Reports: Submit copies of project inspection reports confirming proper installation of Waterproofing System.

1.6 QUALITY ASSURANCE

A. Manufacturer: Obtain primary waterproofing materials of each type required from a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

B. Installer: Submit certificate from Installer, obtained from Manufacturer, that Installer is an approved applicator. Certificate shall clearly indicate that Installer has been trained to install materials and systems specified herein in applications indicated.

C. Pre-installation Conference: Prior to installation of waterproofing and associated work, meet at project site with waterproofing Installer and installers of each component of associated work, including manufacturers representatives and inspection personnel, to coordinate related requirements with waterproofing work. Review material selections and procedures to be followed in performing work. Notify Contracting Officer at least 48 hours before conducting meeting.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturers original containers and bindings with seals and labels intact.

B. Store materials off ground. Cover with waterproof covers.

C. Handle materials to prevent damage. Remove damaged materials and replace with new, undamaged materials.

1.8 PROJECT CONDITIONS

A. Substrate: Proceed with work after substrate construction, openings and penetrating work have been completed.

B. Weather: Install typical products and accessories, specified herein, when temperature is between minus 25ºF and 125ºF. Proceed with waterproofing and associated work only when existing and forecasted weather conditions will permit work performance in accordance with manufacturer's recommendations and warranty requirements for specific project requirements.

1.9 WARRANTY

A. Project Warranty: Submit a written warranty, executed by manufacturer, agreeing to repair or replace membrane waterproofing that fails in materials or workmanship within the specified warranty period, based on the original cost of Work.

1. Warranty period against leakage is five (5) years after date of Substantial Completion.
2. Adjudicated in State of Alabama.

PART 2 - PRODUCTS

2.1 MANUFACTURER'S

A. W. R. Grace - Bituthene 3000 or equal.

B. Carlisle - CCW-705

C. W.R. Meadows Sealtight –Mel-Drain Rolled Matrix Drainage System

D. Requests for substitutions will be considered provided submittal information is received by Architect at least 7 days prior to bid.

2.2 MATERIALS

A. Membrane: Factory-made composite product with a minimum thickness of 0.060". Membrane shall contain adhesive and be covered with a release paper which is removed during installation.

B. Prefabricated Drainage Composite: Hydroduct 2. Drainage Composite shall be designed to promote drainage while serving as a protection course.

C. Mastic: Primer, liquid membrane, tape and accessories shall be as required to each manufacturer.

D. Protection Board Layer: Insulform IX or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. General: Inspect surfaces to receive membrane systems. Ensure that voids greater than 9 mm are filled with grout or with mastic, specified in Part 2 above, and that sharp projections are removed. Report deficiencies to the Design Professional in writing.

B. Do not install membranes or systems in standing water. Note temperature limitations for each product.

C. Vacuum or broom clean surfaces to receive tape, adhesive products or primers. Ensure that such surfaces are free of dust, dirt, snow, ice and other contaminants not compatible with applied products.

3.2 PREPARATION

A. Layout: Lay out project to determine anticipated conditions prior to start of work. Note termination and penetration conditions and determine preferred methods for creating waterproof envelope.

B. Coves: Form coves, 1-1/2” to 2”, with granular bentonite at intersections of walls and footings. Form coves with mastic or sealant at vertical inside corners, under ledges and at penetrations.

C. Priming: Prime surfaces, immediately prior to application of tapes and waterstops, with primer specified in Part 2 above. Prime surfaces, including concrete, masonry, metal and wood, to properly prepare areas to receive waterstops or taped applications and terminations.

3.3 INSTALLATION AT FOUNDATION WATERPROOFING MEMBRANES

A. General: Place membrane over prepared surfaces, vertically and horizontally as applicable for conditions shown, to ensure minimum handling of products. Fit materials closely and seal around inlets, outlets and other penetrations and projections. Comply with installation procedures as recommended by membrane manufacturer. Horizontal terminations shall have termination bar and caulk tray attached 8" O.C.

B. Field Joints: Install membrane shingle fashion to prevent intrusion of water. Overlap a minimum of 1-1/2" typically, depending on installation conditions.

1. Vertical Seam Applications: Nail at 24" to 48" on center as recommended by manufacturer for conditions indicated. Tape seams with temporary tape specified in Part 2 above.

2. Horizontal Seam Applications: Nail at 18" on center, maximum. Tape seams with temporary tape specified in Part 2 above.

C. Penetrations: Cut membrane to fit snugly at penetration. Form cove around penetration with specified mastic. Furnish and install site fabricated collar made from standard waterproofing membrane to fit tightly around penetration and press firmly to embed fully in mastic. Fasten collar and tape in place.

D. Termination: Terminate membrane applications as follows:

1. At concealed grade line terminations, fasten termination bar at top of membrane with caulk tray. Place fasteners at 8 inches on center. Confirm suitability of substrate to accept fasteners. Honor all expansion joints.

2. At exposed grade line terminations, fasten termination bar at top of membrane. Position to permit application of elastomeric sealant, specified in Part 2 of this section. Space fasteners at 8 inches on center. Confirm suitability of substrate to accept fasteners. Honor all expansion joints.

3. At special conditions including, but not limited to soldier piles and beams, construction joints, pipe penetrations and other conditions, based on manufacturer's printed product data, apply water barrier tape specified in Part 2 above.

E. Transitions and Terminations: Comply with manufacturer's specific instructions for special conditions, applications, transitions and terminations.

3.4 PROTECTION

A. Protect against flooding or other activation prior to completion of related work, including, but not limited to, backfill or placement of concrete.

3.5 CLEANING

A. Clean areas and surfaces where work has been performed. Remove trash and debris resulting from the Work of this Section and dispose of legally and properly.

END OF SECTION 071326

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Cavity-wall insulation.
   2. Concealed building insulation.
   3. Exposed building insulation.
   4. Sound attenuation insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

C. Product test reports.

D. Research/Evaluation Reports: For foam-plastic insulation.

1.3 QUALITY ASSURANCE

A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: 1" Thick, ASTM C 578, Type IV**,** with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Available Manufacturers:

a. DiversiFoam Products.
b. Dow Chemical Company.
c. Owens Corning.
d. Pactiv Building Products Division.

2.3 GLASS-FIBER BLANKET INSULATION

A. Available Manufacturers:

1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
3. Johns Manville.
4. Knauf Fiber Glass.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: (If Applicable or as indicated on drawings) ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

C. Kraft Faced, Glass Mineral Wool Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier). EPD Certified by UL Environment, Living Building Challenge – Declare Red List Free.

1. Basis-of-Design Product: Knauf Insulation; EcoBatt with ECOSE Technology, Kraft Faced Batts.
2. R-value per plans and specifications.

D. Foil Faced Batt Insulation: FSK-25 UL listed for fire hazard classification (FAC) 25/50. Use in exposed applications in attic or anywhere insulation is exposed to view.

E. Sound Attenuation Batt Insulation: ASTM C 665, Equal to Owens Corning Quiet Zone Pro.

F. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
   1. 3-5/8 inches thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F.
   2. 5-1/2 inches thick with a thermal resistance of 19 deg F x h x sq. ft./Btu at 75 deg F.
   3. Attic Insulation: Blown or Batt Insulation R-38.

2.4 AUXILIARY INSULATING MATERIALS

A. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate or Angle formed from perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square, welded to projecting copper-coated steel spindle 0.105 inch in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch square or diameter self-locking washers complying with the following requirements:

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.2 INSTALLATION OF CAVITY-WALL INSULATION

A. On units of foam-plastic board insulation, install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates indicated.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
6. For wood-framed construction, (If Applicable or indicated on drawings)install mineral-fiber blankets according to ASTM C 1320 and as follows:

    a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
    b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

D. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.

4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

END OF SECTION 072100

SECTION 07533 THERMOPLASTIC SINGLE-PLY MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Adhered sheet roofing.
2. Roof Insulation

B. Related Sections include the following:

1. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings and counterflashings.
2. Division 7 Section "Joint Sealants."

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definition of terms related to roofing work not otherwise defined in this Section.

1.4 PERFORMANCE REQUIREMENTS

A. General: Install sheet membrane roofing and base flashing that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. FM Listing: Provide sheet membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.

1. Roofing system shall comply with the following:

a. Fire/Windstorm Classification: As per 2015 IBC.
b. UL Class- A

1.5 SUBMITTALS

A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Include plans, sections, and details of the following:

1. Base flashings and membrane terminations.

C. Samples for Verification: Of the following products:

1. 12-by-12-inch square of sheet roofing, of color specified, including T-shaped side and end lap seam.
2. 12-by-12-inch square of roof insulation.
3. 12-inch length of metal termination bars.
4. 6 insulation fasteners of each type, length, and finish.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system.

E. Manufacturer Certificates: Roofing manufacturer shall be required to provide documentation certifying that the roof design provided complies with the performance requirements for that particular system, as set forth in IBC Chapter 15 in Section 1504. This documentation shall be attached to the roof warranty provided at the close out of the project.

F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

G. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of components of roofing system with requirements based on comprehensive testing of current product compositions.

H. Maintenance Data: For roofing system to include in the maintenance manuals specified in Division 1.

I. Warranty: Sample copy of standard roofing system manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.

J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

QUALITY ASSURANCE

K. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing roofing similar to that required for this Project and who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product.

L. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and slopes indicated.
2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing materials are a part.

M. A Pre-Roofing Conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the Owner, General Contractor, Roofing Contractor and Alabama Building Commission Inspector(If Applicable).

N. The Pre-Roofing Conference is intended to clarify demolition (for renovation or re-roofing projects) and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the specifications, roof plans, roof deck information, flashing details, and approved shop drawings, submittal data, and samples. If conflict exists between the specifications and the Manufacturer's requirements, this shall be resolved. If this pre-roofing conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all roof deck areas and substantial agreement on all points.

The following are to be accomplished during the conference:

1. Review all Factory Mutual and Underwriter's Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise. .
2. Establish trade-related job schedules, including the installation of roof mounted mechanical equipment.
3. Establish roofing schedule and work methods that will prevent roof damage.
4. Require that all roof penetrations and walls be in place prior to installing the roof.
5. Establish those areas on the job site that will be designated as work and storage areas for roofing operations. .
6. Establish weather and working temperature conditions to which all parties must agree.
7. Establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.

The Architect shall prepare a written report indicating actions taken and decisions made at this pre-roofing conference. This report shall be made a part of the project record and copies furnished the General Contractor, the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid materials from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.

1.8 WARRANTY- MANUFACTURERS

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship as necessary to eliminate leaks during warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time. Standard manufacturer’s roofing guarantees which contain language regarding the governing of the guarantee by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees.

1. Material Warranty Period: 20 years from date of Substantial Completion.
2. General Contractor’s Roofing Guarantee (ABC Form C-9, August 2001)

B. The Contractor shall provide, to the Owner, a 5-year guarantee which warrants the workmanship of all roofing material including the sheet metal installed in conjunction with the roofing. During this period of time the Contractor will respond within 24-hours to repair any leaks that may occur from faulty workmanship or material.

C. Standard Roofing Manufacturer's Warranty: Submit a written warranty, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:

1. Warranty Period: NDL 20 years.

PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Reinforced 60 mil Thermoplastic Sheet Only

a. Firestone Roofing Prod.
b. Carlisle SynTec Inc.
c. Sarnafil Roofing System
d. Other equal products will be considered provided submittal information is submitted as per Section016000.

2.2 TPO SHEET.

A. TPO Sheet: Flexible Thermoplastic Polyolefin roofing membrane produced with polyester weft inserted reinforcement with physical properties complying with ASTM Test standards for reinforced TPO sheets of the following type, grade, thickness, and exposed face color.
1. Thickness: 60 mils, nominal.
2. Exposed Face Color: White.
3. Insulation: Tapered Polyiso or standard rigid insulation equal to Atlas AC FOAM II. Minimum R-20 edge thickness.

EXECUTION

2.3 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.

2.4 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

2.5 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roof insulation.

C. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/8 inch with insulation.

1. Cut and fit insulation within 1/8 inch of nailers, projections, and penetrations.

D. Attached Insulation: Secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type indicated.

Fasten insulation according to requirements of FM's "Approval Guide" for specified Windstorm Resistance Classification and the insulation and roofing system manufacturers' written instructions.

2.6 ADHERED SHEET INSTALLATION

A. Install thermoplastic sheet over area to receive roofing according to roofing system manufacturer's written instructions. Unroll sheet and allow to relax for a minimum of 30 minutes.

1. Install sheet according to ASTM D 5036.

B. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Apply bonding adhesive to substrate and underside of sheet at rate required by manufacturer and allow to partially dry. Do not apply bonding adhesive to seam area of sheet.

D. Mechanically fasten sheet securely at terminations and perimeter of roofing.

E. Apply roofing sheet with side laps shingled with slope of roof deck where possible.

F. Clean seam areas, overlap sheets, and weld side and end laps of sheets and flashings according to manufacturer's written instructions to ensure a watertight seam installation. Weld seam as follows:

1. Weld Method: Hot air as standard with roofing system manufacturer.

G. Test lap edges with probe to verify seam weld continuity. Apply seam calk to seal cut edges of sheet membrane.

H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

2.7 FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrate according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of flashing sheet at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with sheet flashing as recommended by manufacturer.

D. Clean seam areas, overlap sheets, and firmly roll flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

E. Test lap edges with probe to verify seam weld continuity. Apply lap sealant and seal exposed edges of sheet flashing terminations.

F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

2.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Consultant.

1. Notify Consultant or Owner one week in advance of the date and time of inspection.

2.9 PROTECTING AND CLEANING

A. Protect sheet membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Consultant and Owner.

B. Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

END OF SECTION

Goodwin Hall Renovations and Band Rehearsal Hall Additions
Auburn University
AU Project No. 15- 255

SECTION 074113 - PREFORMED ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-finished standing seam - interlocking metal roofing.

B. Accessories and trim for metal roofs.

1.2 RELATED SECTIONS

A. Section 07620 - Flashing and Sheet Metal.

1.3 QUALITY ASSURANCE

A. Applicable Standards:

1. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc.

2. AISC: "Steel Construction Manual", American Institute of Steel Construction.

3. AISI: "Cold Form Steel Design Manual", American Iron and Steel Institute.

4. ASTM A 792-83-AZ50: "Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated (Galvanized) by the Hot Dip Process, General Requirements (Galvalume)", American Society for Testing and Materials.

5. ASTM E 1514-93: "Standard Specification for Structural Standing Seam Steel Roof Panel Systems", American Society for Testing and Materials.

6. UL: "Tests for Uplift Resistance of Roof Assemblies", Underwriters Laboratories, Inc.

7. ASTM E 1592-95: "Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials.

8. ASTM E 1680-95: "Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems", American Society for Testing and Materials.

9. ASTM E 1646-95: "Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference", American Society for Testing and Materials.

B. Manufacturer's Qualifications:

1. Manufacturer has a minimum of three years experience in manufacturing panels of this nature. Panels specified in this section shall be produced in a factory environment (not job site) with fixed base roll forming equipment to assure the highest level of quality control. A letter certifying compliance should accompany the product material submittal.

C. Installer's Qualifications:

1. Installer of the system shall be an approved installer, certified by the manufacturer, and meet the following minimum criteria:

a. Maintain a $250,000 general liability coverage for each loss.

b. Maintain sufficient worker's compensation coverage as mandated by law.

c. Has no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.

d. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.

e. Project foreman is the person having received specific training in the proper installation of the specified system and will be present to supervise whenever material is being installed. Specific training program shall include the following:

1. The instructor must have a minimum of 10 years' experience.

2. A formal curriculum.

3. Classroom instruction with review and thorough understanding of the specific product's technical manual.

4. Hands-on-mock-up instruction with a review and thorough understanding of the specific product's details.

5. The installer must pass a written and oral exam.

f. Provide five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installer.

g. Provide certification letter that installer has a minimum of three years' of metal product installation experience immediately preceding the date upon which work is to commence.

1.3A SYSTEM PERFORMANCE REQUIREMENTS

A. Performance Testing:

1. Metal roof system must be tested in accordance with Underwriters Laboratories, Inc. (UL) Test Method 580 “Tests for Uplift Resistance of Roof Assemblies”.

2. Metal roof system must be installed in accordance with UL Construction methods.

3. Resist the roof design pressures calculated in accordance with 2006 International Building Code as required for Sylacauga, Al. Determine panel bending and clip-to-panel strength by testing in accordance with ASTM E 1592-95. Capacity for gauge, span or loading other than those tested may be determined by interpolating test results.

4. Metal roof system must meet the air infiltration requirements of ASTM E 1680-95 when tested with a 20 PSF pressure differential with resulting air infiltration of 0.0011 cfml/sq. ft.

5. Metal roof system must meet the water penetration requirements of ASTM E 1646-95 when tested with a 20.00 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.

6. Metal roof system must meet the wind conditions of the project requirements as stated on Structural Drawings.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, standard details, certified product test results, installation instructions and general recommendations, as applicable to materials and finishes for each component and for total system of preformed panels.

B. Samples: Submit two samples, 12" square, of each exposed finish material.

C. Shop Drawings: Submit small-scale layouts of panels on roofs, and large-scale details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory and field assembly work.

D. Engineering data is to be provided for the roof system to include design pressures, clips, panels, fastener locations, etc.. Engineering data is to be signed and sealed by an engineer registered in the State of Alabama.

1.5 WARRANTIES

A. Metal roof system manufacturer, upon final acceptance for project, furnish a warranty covering bare metal against rupture, structural failure and perforation due to normal atmospheric corrosion exposure for a period of 20 years.

B. Covering paint finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years for roof panels and for wall panels (see 2.2, E. Finishes).

C. Metal roof manufacturer, upon final acceptance of this project, shall provide a 20 year weather tight warranty covering wind with 2 second gusts up to 130 mph.

D. Standard manufacturer's roofing guarantees which contain language regarding the governing of the guarantee by any state other than the State of Alabama, must be amended to exclude such language, and substituting the requirement that the Laws of the State of Alabama shall govern all such guarantees.

1.6 TEST REPORTS:

A. Submit Test Reports showing that metal panels have been tested in accordance with the Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference of ASTM E 1592-95.

B. Submit Test Reports showing that metal panels meet the air infiltration requirements of ASTM E 1680-95 when tested with a 6.24 PSF pressure differential with resulting air infiltration of 0.0071 cfm/sq. ft.

C. Submit Test Reports showing that metal panels meet the water penetration requirements of ASTM E 1646-95 when tested with a 12.00 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.

1.7 METAL ROOF SYSTEM FABRICATION CERTIFICATION:

A. Submit a letter from the metal roof system manufacturer certifying the panels have been produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment.

1.8 THIRD PARTY METAL ROOF CONSULTANT APPROVAL:

A. Submit a letter from the metal roof system manufacturer indicating acceptance of the general contractor's third party metal roofing consultant for use on this specific project.

1.9 INSTALLATION CONTRACTOR'S QUALIFICATIONS:

A. Submit certificate from manufacturer certifying that installer of the metal roof system has met all of the criteria outlined in "1.02 C. Installer's qualifications" and is an authorized installer certified by the manufacturer within one year of the beginning of installation of the metal roof system.

B. Submit the formal syllabus for the classroom and hands-on training.

C. Submit five references from five different architects or building owners for projects

that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

1.10 METAL ROOF SYSTEM INSTALLATION INSPECTION REPORTS:

A. Submit written and photographic metal roof system installation inspection reports from the general contractor's third party metal roof consultant appraising the installation of the metal roof system. The written and photographic inspection reports are to be submitted to the architect (owner), metal roof system manufacturer, metal roof system installation contractor and general contractor.

B. A separate report is to be submitted for each of the following stages of the metal roof system installation:

1.At Final Completion of all metal roof system work.

1.11 PRE-ROOFING CONFERENCE

A. A Pre-Roofing Conference is required before any roofing materials are installed. This conference shall be conducted by a representative of the Architect and attended by representatives of the Owner, General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable), Alabama Building Commission Inspector and the Roofing Materials Manufacturer (if warranty is required of this manufacturer). If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

B. The Pre-Roofing Conference is intended to clarify demolition (for renovation or re-roofing projects) and application requirements for work to be completed before roofing operations can begin. This would include a detailed review of the specifications, roof plans, roof deck information, flashing details, and approved shop drawings, submittal data, and samples. If conflict exists between the specifications and the Manufacturer's requirements, this shall be resolved. If this pre-roofing conference cannot be satisfactorily concluded without further inspection and investigation by any of the parties present, it shall be reconvened at the earliest possible time to avoid delay of the work. In no case should the work proceed without inspection of all roof deck areas and substantial agreement on all points.

The following are to be accomplished during the conference:

1. Review all Factory Mutual and Underwriter's Laboratories requirements listed in the specifications and resolve any questions or conflicts that may arise.

2. Establish trade-related job schedules, including the installation of roof mounted mechanical equipment.
3. Establish roofing schedule and work methods that will prevent roof damage.

4. Require that all roof penetrations and walls be in place prior to installing the roof.

5. Establish those areas on the job site that will be designated as work and storage areas for roofing operations.

6. Establish weather and working temperature conditions to which all parties must agree.

7. Establish acceptable methods of protecting the finished roof if any trades must travel across or work on or above any areas of the finished roof.

The Architect shall prepare a written report indicating actions taken and decisions made at this Pre-Roofing conference. This report shall be made a part of the project record and copies furnished to the General Contractor, the Owner, the Building Commission, and the Building Commission Inspector."

PART 2 - PRODUCTS

2.1 MANUFACTURER: Series: Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.:

1. Basis of Design - MBCI 18" BATTENLOK 24 ga with striations.

2. Morin Corporation

3. Architectural Integrated Metal (AIM)

2.2 MATERIALS

A. Metal Roof System Profile:

1. 2" vertical high rib x 18" wide panel.

B. Clip:

1. Manufacturer is to design, engineer, coordinate and provide a clip that meets the requirements of this project per wind requirements, insulation, deck conditions, etc.

C. Texture:

1. Embossed (minimizes oil canning effect).

D. Finish:

1. Fluoropolymer Two-Coat System. Basis of Design: MBCI, Signature 300 or equal.

E. Color:

1. Architect's selection. From standard colors.

2.3 MISCELLANEOUS MATERIALS

A. Underlayment: Equal to W.R. Grace Ice and Water Shield HT.

B. Internal Panel Framing: Manufacturer's standard.

C. Fasteners: Manufacturer's standard noncorrosive types, with exterior heads gasketed.

D. Accessories: Provide all components required for a complete metal roofing system, including trim, corner units, ridge vents, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, valleys and similar items. Match materials/finishes of preformed panels.

E. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15 mil dry film thickness per coat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with panel fabricator's and material manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal/structural movement.

1. Install roof panels with concealed fasteners.

B. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4" in 20'-0" on level/plumb/slope and location/line as indicated, and within 1/8" offset of adjoining faces and of alignment of matching profiles.

C. Seaming: Complete seaming of panel joints by operation of portable power-driven equipment of type recommended by panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers and sealants where indicated and where required for weatherproof performance of panel systems. Provide types of gaskets and sealants/fillers indicated or, if not otherwise indicated, types recommended by panel manufacturer.

1. Refer to other sections of these specifications for product and installation requirements applicable to indicated joint sealers.

3.2 CLEANING AND PROTECTION

A. Damaged Units: Replace panels and other components of the work which have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films (if any) as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets and counterflashing.
2. Formed steep-slope roof sheet metal fabrications.
3. Aluminum Fascia/Parapet Coping.
4. Aluminum Leader Heads and Downspouts

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

D. Maintenance data.

E. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

B. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia, fascia trim, apron flashing, approximately 10 feet (3.0 m) long, including supporting construction cleats, seams, attachments and accessories.

1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet:.032 Thick ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Factory Prime Coating: Where painting after installation is indicated, pretreat with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil (0.005 mm).

a. Color: As selected by Architect from manufacturer’s full range.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

1. Material: Pre-finished Aluminum, 0.024 inch (0.61 mm) thick.
2. Finish: With manufacturer's standard color coating.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

F. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Fabricate from the following materials: 0.024 Aluminum 5”x5”.

B. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:

C. Drip Edges: Fabricate from the following materials:

1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:

1. Pre-finished Aluminum: 0.032 inch (0.81 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
4. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.2 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.

C. Splash Pans: (If applicable) Install where downspouts discharge on low-slope roofs. Set in adhesive material compatible with the roofing.

D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch (25 mm) below gutter discharge.

E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements[, sheet metal manufacturer's written installation instructions,] and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry."

C. Reglets: Installation of reglets is specified in Division 04 Section "Unit Masonry."

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 078123
INTUMESCENT FIREPROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this section.

1.02 DEFINITIONS

A. Intumescent coatings: Material or combination of fireproofing materials used to help retain the structural integrity of steel members by maintaining an effective thermal barrier to provide fire resistance rating as documented by listings from accredited test laboratories.

1.03 GENERAL DESCRIPTION OF THE WORK IN THIS SECTION

A. Intumescent coatings applied to primary and secondary structural steel members to provide specified fire resistance rating.

1.04 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Section 01 40 00 – Quality Assurance
2. Section 07 21 00 - Thermal Insulation

1.05 REFERENCES

A. Underwriters Laboratories Inc. (UL) Fire Resistance Directory

B. Test Requirements and Reference Standards:

1. ASTM E119,"Standard Test Methods for Fire Tests of Building Construction and Materials"
2. ASTM E84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
3. ASTM D2240, "Standard Test Method for Rubber Property—Durometer Hardness"
4. ASTM D2794, "Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)"
5. ASTM D4060, "Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser"
6. ASTM D4541, "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers"
7. ASTM E329-09, "Standard Specification for Agencies Engaged in Construction Inspection and Testing"
8. National Fire Protection Association, NFPA 251
9. Underwriters Laboratories Inc. (UL) ANSI/UL263
10. Underwriters Laboratories of Canada (ULc) CAN/ULC S101-M
11. Association of the Wall and Ceiling Industry, AWCI Technical Manual 12-B, current edition.

C. Building codes: 2009 International Building Code (IBC)

D. Industry References:
1. Underwriters Laboratories (UL), www.ul.com
2. Underwriters Laboratories of Canada (ULC), www.ulc.ca
2. National Fireproofing Contractors Association (NFCA), www.nfca-online.org/
3. The Society for Protective Coatings (SSPC), www.sspc.org/
4. Association of the Wall and Ceiling Industry (AWCI), www.awci.org

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company responsible for the manufacture of fire protection materials with local direct technical employee(s) (as distinct from distributors or authorized agents) readily available at the project site. Intumescent coatings shall be manufactured under the follow-up services program of Underwriter's Laboratories (UL) or UL Canada (ULc) and bear the UL (and/or ULc) label (mark). Manufacturer's technical representative to be on site during start of installation and be generally available on site as requested during the application process.

B. Installer Qualifications: Engage experienced Installer certified, licensed, or otherwise qualified by the intumescent coatings manufacturer as having the necessary training to install manufacturer's products, and otherwise have the experience and staff to properly perform the installation. Installer shall be trained by the intumescent coatings manufacturer's direct employee(s) (as distinct from distributors or authorized agents).

C. Installation: Verify steel members have been properly prepared, including the use of a compatible primer, and install intumescent coatings in accordance with manufacturer's written recommendations published in their product technical literature and/or provided by manufacturer.

D. Product Identification: Label packages (pail or bucket) with manufacturer name, product name, expiration date, freeze tag, UL or ULc label (mark).

E. Special Inspection: Owner to employ a qualified independent inspection and testing agency to perform field quality control testing services in accordance with AWCI Technical Manual 12-B, local building code and Authority Having Jurisdiction requirements.

F. Inspection and Testing Agency Qualifications: ASTM E329-09, "Standard Specification for Agencies Engaged in Construction Inspection and Testing" and AWCI Technical Manual 12-B.

G. Field Constructed Mockups: Prior to installing intumescent coatings, Installer shall apply products specified for exposed applications to demonstrate aesthetic qualities and workmanship. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Location: As indicated on drawings.
2. Extent of Mockups: Approximately 5 sq. ft. of surface for each product indicated.
3. Notify architect one week in advance of the dates and times when mockups will be built.
4. Obtain architect's written acceptance of mockups before start of actual unit of work.
5. Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed units of work.

a. Accepted mockups in undisturbed condition at time of substantial completion may become part of completed unit of work.

1.07 SUBMITTALS

A. Product data for each intumescent coating indicated on drawings and Finish Schedule.

B. Product certificates from manufacturer documenting intumescent coatings comply with specified requirements including those for fire test response characteristics and compatibility with adhesives, primers, and other surface coatings on substrates indicated to receive intumescent coatings.

C. Fire Resistance Rating Listings: UL, ULc, or other accredited testing agency indicating type and size of steel member to receive intumescent coatings and minimum dry thickness (mils) to achieve specified fire resistance rating.

D. Qualification Data: Installer to demonstrate capabilities and experience on completed projects which are comparable in size and scope by providing the following information:

1. Project location: City, State, and Country
2. Scope of work: project type, contract valuation
3. Completion date
4. Architect: firm and contact information
5. Owner: name and contact information

E. LEED Submittals:

1. Product Data for Credit EQ c4.2: Low emitting materials – Adhesives and sealants, documentation including printed statement of VOC content.
2. VOC content: 0 g/L according to EPA method 24.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened packages with manufacturer's labels intact and legible.

B. Install intumescent coatings prior to expiration date included on packaging. Properly discard expired product.

C. Store intumescent coatings protected from direct sunlight and maintained at a temperature as specified by the manufacturer. The product must not be frozen, or stored at freezing temperatures. Verify proper storage of material as indicated by the freeze indicator label attached to the pail. Identify and label material damaged due to improper storage, remove from Project site and properly discard.

1.09 PROJECT CONDITIONS

A. Environmental Conditions:

1. Do not install Intumescent Coatings when ambient or substrate temperatures are, or prior to full cure will be, outside the manufacturer's recommended installation temperatures, unless temporary protection and heating/cooling is provided to maintain temperatures within the prescribed range for the period specified by the manufacturer.
2. Do not install intumescent coatings when relative humidity is outside the limits established by the manufacturer. Consult manufacturer to determine precautions that may be implemented to prevent condensation from forming on the steel during application of fireproofing.

3. Do not install intumescent coatings when relative humidity exceeds 80%. Consult manufacturer to determine precautions that may be implemented to prevent condensation from forming on the steel during application of fireproofing.

B. Ventilation: Ventilate areas where intumescent coatings will be installed by natural means or, where this is inadequate, forced air circulation during and after application until fireproofing dries thoroughly.

1.10 SEQUENCING

A. Sequence and coordinate application of intumescent coatings with related work specified in other Sections to comply with the following requirements:

1. Coordinate installation of intumescent coatings with other items of work that may interfere with proper installation of coatings.
2. Do not begin applying intumescent coatings until clips, hangers, supports, and other welded connections have been installed. Intumescent coatings manufacturer must approve in writing any clips, hangers, supports or connections that may installed over coating using mechanical or adhesive devices.
3. Provide temporary enclosures as necessary to prevent deterioration of intumescent coatings due to exposure to unfavorable environmental conditions.
4. Take appropriate steps to avoid abrasion and other damage to the applied intumescent coatings during construction operations.
5 Do not protect or conceal structural members to which intumescent coatings have been applied until each area has been inspected, tested, and corrections have been made to any deficient areas.

PART 2 - PRODUCTS

2.1 FIREPROOFING

A. Intumescent coatings: Factory mixed formulation consisting of a modified heavy bodied coating, water based, with inorganic reinforcing fibers (non-asbestos, non fiber-glass) for spray application.

1. Products: Subject to compliance with requirements, provide the following:

a. Hilti Fire Finish CFP-SP WB by Hilti, Inc.,
(800) 879-8000, www.us.hilti.com
(800) 363-4458, www.hilti.ca

b. Staycell ONE STEP 255 spray applied polyurethane foam insulation.

c. JM Ignition Barrier Coating.

d. RHH Foam Systems DC 315

e. Fire Free Coatings 88.

f.

B. Physical Characteristics:

1. Surface Burning Characteristics of Building Materials, ASTM E 84 (UL 723, CAN/ULC-S102): Class A Rating.
   a. Flame Spread: 0
   b. Smoke Development 45
2. Durometer Hardness, ASTM D2240: 96 Shore A

3. Impact Resistance, ASTM D2794: 93 in-lb
4. Abrasion Resistance, ASTM D4060: 0.140 g/1000 cycles
5. Adhesion, ASTM D4541: 507 psi

2.2 AUXILIARY FIREPROOFING MATERIALS

A. General: Provide auxiliary fireproofing materials that are compatible with intumescent coating products and substrates and are approved by UL or other accredited testing agencies acceptable to authorities having jurisdiction for use in the fire resistive designs indicated.

B. Substrate Primers: For use on each different substrate, provide primer that complies with the following requirements:

1. Primer approved in writing by manufacturer of intumescent coatings, and applied in full compliance with the primer manufacturer's recommendations. Primer must be fully cured prior to installation of the intumescent coating.

C. Topcoats: Suitable for application over applied intumescent coatings; of type recommended in writing by intumescent coatings manufacturer for each fire resistance design. Color of topcoat shall be as selected by the architect. Colors shall not be limited to manufacturer's standard colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cover other work subject to damage from fall out or overspray of intumescent coatings materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintaining adequate ambient conditions for temperature and ventilation.

B. Clean substrates of substances that could impair bond of fireproofing, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.

C. Prime substrates except where compatible shop primer has been applied and is in satisfactory condition to receive intumescent coatings. Primer must be fully cured prior to applying intumescent coatings.

D. Apply intumescent coatings: Protect intumescent coatings from rain, direct sunlight, high humidity, strong wind (with dirt, dust or sand) during the application and drying phases. Do not apply an additional coat of intumescent coating until previous layer has fully cured.

E. For applications visible upon completion of project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections that would telegraph through fire resistive products after application.

3.2 INSTALLATION, GENERAL

A. Coordinate application of intumescent coatings with other construction to allow for proper application and minimize need to repair damage.

B. Comply with intumescent coatings manufacturer's instructions for mixing materials, application procedures, and types of equipment used to convey and install products, as applicable to the particular conditions of installation and as required to achieve fire resistance ratings indicated.

C. Coat substrates with primer and allow proper cure time prior to applying intumescent coatings as recommended by intumescent coatings manufacturer for material and application indicated.

D. Apply intumescent coatings identical to mock-ups.

3.3 INSTALLING INTUMESCENT FIREPROOFING

A. Apply intumescent coatings in thicknesses required to achieve fire resistance ratings designated for each condition.

B. Provide a uniform finish complying with description indicated for type of material and matching finish approved for field erected mockup.

3.4 FIELD QUALITY CONTROL

A. Inspection and Testing Agency: Coordinate installation of fireproofing with owner's independent inspection and testing agency.

B. Inspection & testing shall be in accordance with AWCI Technical Manual 12-B.

C. Testing agency will promptly report test results in writing to the installer and architect.

D. Remove and replace intumescent coatings where test results indicate that fireproofing does not comply with specified requirements for adhesion.

E. Apply additional intumescent coatings per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.

F. Additional Testing: Where intumescent coatings are removed and replaced or repaired, Owner's inspection and testing agency shall perform additional testing to determine compliance with specified requirements.

3.5 CLEANING, REPAIR, AND PROTECTION

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove product over spray and fall out from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Cure intumescent coatings according to manufacturer's recommendations.

C. Protect intumescent coatings from damage during construction.

D Repair or replace work that was not properly protected from damage during construction in accordance with manufacturer's recommendations.

E. Ensure full curing of intumescent coating prior to application of top coat.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.2 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

    a. Penetrations located outside wall cavities.
    b. Penetrations located outside fire-resistance-rated shaft enclosures.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.

D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application as required to maintain ratings and meet building codes.

1. A/D Fire Protection Systems Inc.
2. Grace, W. R. & Co. - Conn.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M; Fire Protection Products Division.
10. Tremco; Sealant/Weatherproofing Division.
11. USG Corporation.

2.2 FIRESTOPPING

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

PART 3 - EXECUTION

3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.2 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fire-resistive joint systems for the following: (Where Applicable or Indicated on Drawings)

1. Floor-to-floor joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Wall-to-wall joints.
5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.

B. Related Sections include the following:

1. Division 07 Section "Thermal Insulation" for floor-to-wall joints indicated as perimeter fire-containment systems between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated exterior curtain walls.
2. Division 07 Section "Joint Sealants" for non-fire-resistive joint sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, indicated as determined by UL 2079.

1. Load-bearing capabilities as determined by evaluation during the time of test.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated on the Life Safety Plan adjacent assembly ratings and as determined by NFPA 285 and UL 2079.

1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.

G. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

C. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and

follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.

2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:

    a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
    b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated on the drawings.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would

otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.5 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078446

SECTION 07900 JOINT SEALANTS

1PART - GENERAL

1.1 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.

1.2 SUMMARY

A. This Section includes joint sealants for the following applications:

1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
2. Exterior joints in horizontal traffic surfaces.
3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
4. Interior joints in horizontal traffic surfaces.

B. See Division 08 Section "Glazing" for glazing sealants.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Preconstruction field test reports.

D. Compatibility and adhesion test reports.

E. Product certificates & test reports.

1.5 QUALITY ASSURANCE

A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to ASTM C 1087 to determine

whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.6 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Twenty (20) years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Twenty (20) years from date of Substantial Completion.

2PART - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Single-Component Silicone Sealant:

1. Products:

a. Sealant shall be equal to Dow Corning Corporation 795. (Basis of Specification).

C. Other manufacturer's products will be considered provided the product information is submitted to the Architect in accordance with Section 016000.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

3PART - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.

a.Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

2. Remove laitance and form-release agents from concrete.

a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Installation of Preformed Silicone-Sealant System: Comply with manufacturer's written instructions.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

SECTION 081100 STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Rated and Non-Rated standard fully welded hollow metal doors and frames.

B. Related Sections

1. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.

2. Division 9 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.

2. Details of doors, including vertical and horizontal edge details and metal thicknesses.

3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

4. Locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.

6. Details of anchorages, joints, field splices, and connections.

7. Details of accessories.

8. Details of moldings, removable stops, and glazing.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: (If Applicable or Noted On Drawings) Assemblies complying with NFPA 80 are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, complying to both negative pressure testing (ASTM E152 and UL-10B) and positive pressure standards (UBC 7-2 and UL-10C)

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. Amweld Building Products, LLC.

2. Ceco Door Products; an Assa Abloy Group company.

3. Curries Company; an Assa Abloy Group company.

4. Mesker Door Inc.

5. Steelcraft; an Ingersoll-Rand company.

6. Windsor Republic Doors.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Glazing: Comply with requirements in Division 8 Section "Glazing."

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel .

2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection ratings indicated. (If Applicable or Indicated On Drawings)

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.

4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.

5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from 16 gauge metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

C. Interior Doors: Face sheets fabricated from 18 gauge cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Fire Rated Doors: In compliance or fire tested in accordance with the latest revision of ANSI/UL 10B or NFPA 252. 9If Applicable or Noted On Drawings)

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: A60 galvanized.

1. Fabricate frames as face welded unless otherwise indicated.

2. Frames for Level 2 Steel Doors: 0.064-inch- thick steel sheet (14 gauge).

C. Interior Frames: Fabricated from cold-rolled steel sheet (16 gauge).

1. Fabricate frames as continuously face welded unless otherwise indicated.

2. Frames for Wood Doors: 0.053-inch- thick steel sheet.

3. Frames for Borrowed Lights: Same as adjacent door frame.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

E. Fire Rated Frames: In compliance or fire tested in accordance with the latest revision of ANSI/UL 10B or NFPA 252.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less t 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

3. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 LOUVERS (If Applicable or Noted On Drawings)

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

2. Glazed Lites: Factory cut openings in doors.

3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      1) Three anchors per jamb from 60 to 90 inches high.

   b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      1) Three anchors per jamb up to 60 inches high.

   c. Compression Type: Not less than two anchors in each jamb.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8 or ANSI/NAAMM-HMMA 861.

2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.

2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

4. Provide loose stops and moldings on inside of hollow metal work.

5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pre-treating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.

b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

c. Install frames with removable glazing stops located on secure side of opening.

d. Install door silencers in frames before grouting.

e. Remove temporary braces necessary for installation only after frames have been properly set and secured.

f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

g. Field apply bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.

6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

7. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.

    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch .

    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 081416 FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-Rated and Fire-Rated solid-core doors with wood-veneer faces.

2. Factory finished flush wood doors.

B. Related Sections:

1. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.

2. Indicate dimensions and locations of cutouts.

3. Indicate requirements for veneer matching.

4. Indicate doors to be factory finished and finish requirements.

C. Samples: For factory-finished doors.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated." WDMA I.S.1-A, "Architectural Wood Flush Doors." WI's "Manual of Millwork."

C. Forest Certification: Provide doors made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at according to NFPA 252 or UL 10B.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Algoma Hardwoods, Inc.
2. Ampco, Inc.
3. Buell Door Company Inc.
4. Chappell Door Co.
5. Eggers Industries.
6. Graham; an Assa Abloy Group company.
7. Ipik Door Company.
8. Lambton Doors.
9. Marshfield Door Systems, Inc.
10. Mohawk Flush Doors, Inc.; a Masonite company.
11. Oshkosh Architectural Door Company.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide 5-ply doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.

C. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2 , made with binder containing no urea-formaldehyde resin.
2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

D. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf .

b. Screw Withdrawal, Edge: 400 lbf.

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragalsComply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.

2. Species: Natural birch.

3. Cut: Rotary cut.

4. Match between Veneer Leaves: Book match.

5. Assembly of Veneer Leaves on Door Faces: Running match.

6. Pair and Set Match: Provide for doors hung in same opening.

7. Core: Particleboard for non-rated doors and mineral core for fire rated doors. .

8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.4 LOUVERS AND LIGHT FRAMES

A. Metal Louvers (if applicable):

1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint finish.

2. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.

C. Transparent Finish:

1. Grade: Premium.

2. Finish: WDMA TR-6 catalyzed polyurethane.

3. Staining: As selected by Architect from manufacturer's full range.

4. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.

Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION

SECTION 083323 FIRE-RATED OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:

1. Fire-Rated Overhead Coiling Door. (45 Minute)

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

1. Wind Load: As per 2015 IBC.

B. Operational Life: Design components to operate for not less than 10,000 cycle.

1. Operation Cycle: One complete cycle begins with door in closed position. Door is then moved to open position and back to closed position.
2. Include tamperproof cycle counter.

C. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this project.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details of installation, wiring diagrams(If Applicable), and attachments to other Work.

1. Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

C. Samples: For each exposed finish.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door

without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated.

A. Door Equal To: Raynor Rolling Doors Model FIRECOIL.

B. Other approved manufacturers: Overhead Door Company, C.H.I. Overhead Doors, Cookson Co., Wayne-Dalton Corp.

C. Door Construction:

1. Steel Door Curtain Slats: Structural-quality, cold-rolled galvanized steel sheets, ASTM A 653/A 653M, with G90 (Z275) zinc coating.

2. Slat Type: Flat profile.

B. Endlocks, General: Locate locks on every other curtain slat for curtain alignment and resistance against lateral movement.

1. Service Door Endlocks: Malleable-iron castings galvanized after fabrication, and secured to curtain slats with galvanized rivets, or high-strength nylon.

C. Windlocks: Malleable-iron castings secured to curtain slats with galvanized rivets or high-strength nylon, as required to comply with wind load.

D. Bottom Bar: 2 angles, minimum 1-1/2 by 1-1/2 by 1/8 inch, in material matching curtain slats.
1. Astragal: Replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, that is cushion bumper for interior door.
2. Motor-Operated Doors: With combination bottom astragal and sensor edge.

E. Curtain Jamb Guides: Steel angles, or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading.

1. Service Doors: Build up units with not less than 3/16-inch- (5-mm-) thick, galvanized steel sections complying with ASTM A 36/A 36M, and ASTM A 123. Slot bolt holes for guide adjustment. Prevent overtravel of curtain with removable stops on guides and hold windlocks with continuous bar.

2.3 HOODS AND ACCESSORIES

A. Hood: Form to enclose coiled curtain and operating mechanism at opening head and act as weatherseal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.

1. Steel-Door Hoods: Fabricate from not less than 0.028-inch (0.7-mm) thick, hot-dip galvanized steel sheet that matches slat material.

2. Shape: Square.

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch (2.0 mm) thick.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and at top of exterior doors, unless otherwise indicated. At door head, use 1/8-inch- (3-mm-) thick, replaceable, continuous sheet secured to inside of curtain coil hood.

1. Manual Operation: Manual Push Up. (crank operation)

Jamb Seals: Replaceable, adjustable, continuous, flexible, 1/8-inch- (3-mm-) thick seals of flexible vinyl, rubber, or neoprene at door jambs for weathertight installation.

D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
1. Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.

E. Slide Bolt: Fabricate with side locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

F. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.

1. Locking Bars: Single-jamb side.

a. Operation: From inside and outside.

2. Lock Cylinder: As specified in Division 8 Section "Door Hardware.

G.
Chain Lock Keeper: Suitable for padlock.

H. Counterbalancing Mechanism: Adjustable, oil-tempered, heat-treated steel helical torsion springs mounted around structural carbon-steel pipe, and contained in barrel of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load; with grease-sealed bearings or self-lubricating graphite bearings.

1. Mounting Brackets: Cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2. Manual Door Operator: Push up; lift or pull for door operation not exceeding 25 lbf 111 N.

2.4 FINISHES

A. Baked-Enamel or Powder-Coated Finish:

1. Color and Gloss: As selected from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports.

B. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain doors.

END OF SECTION

SECTION 083326 ROLLING COUNTER FIRE SHUTTER

1PART - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:

1. Rolling Counter Fire-Shutter.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details of installation, wiring diagrams, and attachments to other Work.

1. Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

C. Physical color chart of finishes available.

1.4 FIRE RATING

A. Rating: Rolling counter fire shutter doors shall achieve a rating of 3/4-hour.

1. Underwriters Laboratory (UL)

B. Certifications: Rolling counter fire shutters shall be provided with:
1. Factory Mutual Listing.
2. UL Classified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS – BASIS OF DESIGN: RAYNOR FIRECURTAIN STANDARD.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Overhead Door Corporation.
2. Cookson Corp.
3. C.H.I.
4. Wayne Dalton Co.

2.2 OPERATION:

A. Operation Type: Rolling counter fire shutters shall be operated by:
1. Hand Crank: as normally-provided by means of a gear reduction hand crank, for rolling counter fire shutter over 10’ wide and/or 7’ high.

B. Mounting: 1. Face-Mount: as normally-provided and fastened to the face of the wall opening.

2.3 CURTAIN

A. Material: The curtain shall consist of 22 gauge (.030 minimum steel thickness) interlocking steel slats roll-formed from commercial quality hot-dipped galvanized (G-90) steel per ASTM A-653.

B. Slat Type: The rolling counter fire shutter curtain shall be comprised of interlocking, flat type steel slats.

C. Finish/Color: The curtain shall be finished in Baked Enamel Powder coat. Architect to select from manufacturer's standard color selection.

D. Endlocks: Lateral movement of the slats to be contained by means of zinc-plated stamped steel endlocks fastened to the slat.

E. Bottom Bar and Seal: Bottom bar shall be roll-formed painted tubular steel. The bottom bar shall include ¼" thick protective strip to cushion impact of bottom bar on countertop.

2.4 GUIDES

A. Guide Assemblies: Guides shall consist of 13 gauge steel, formed from galvanized steel and finished to match the curtain.

B. Jamb Construction: Rolling counter fire shutter shall be mounted to:
Masonry Jambs: as optionally-provided, and supplied with anchor bolt fasteners.

2.5 COUNTERBALNACE SYSTEM

A. Headplates: Mounting brackets shall be made from 10 gauge galvanized steel plate and attached to the wall and guide.

B. Barrel: The barrel shall be made from a minimum 4 ½" O.D. x .120" wall structural steel pipe. Deflection of pipe under full load shall not exceed .03" per foot of span.

C. Counterbalance
1. The curtain shall be counterbalanced by means oil-tempered, helical torsion springs, grease packed and mounted on a continuous steel torsion shaft.

2.6 ENCLOSURE

A. Hood: Rolling counter fire shutter shall be furnished with a square hood enclosure comprised of 24 gauge steel finish-painted to match the curtain.

B. Headplate Cover: Rolling counter fire shutter shall be furnished with an enclosure for the headplates, consisting of 24 gauge steel finish-painted to match the curtain.

2.6 RELEASE SYSTEM

Descent Control: Rolling counter fire shutter shall be controlled by a centrifugal governor during automatic closing of the door.

A. Release Type: Automatic closing of rolling counter fire shutter under fire conditions to be initiated by :
1. Fusible Links

2.7 HARDWARE

A. Lock: Thumb Lock: with a locking bar for use with push-up and hand crank operated doors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports.

B. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain doors.

END OF SECTION

SECTION 083473 STEEL ACOUSTICAL DOOR ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

1.1.1 Pre-hung steel acoustical door assemblies

1.2 RELATED SECTIONS

1.2.1 Section 87100 - Door Hardware

1.2.2 Section 88000 - Glazing

1.2.3 Sections 99123 and 99123 - Paints and Coatings

1.3 REFERENCES

1.3.1 ASTM A 366 - Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality

1.3.2 ASTM A 569 - Standard Specification for Steel, Carbon, (0.15 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial Quality

1.3.3 ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Gal annealed) by the Hot Dip Process

1.3.4 ASTM B 117 - Standard Method of Salt Spray (Fog) Testing

1.3.5 ASTM D 1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus

1.3.6 ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions

1.3.7 ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings

1.3.8 ASTM E 413 - Classification for Determination of Sound Transmission Class

1.3.9 HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; Hollow Metal Manufacturers Association

1.4 SYSTEM DESCRIPTION

1.4.1 Design requirements: Pre-hung acoustical door assemblies to include doors, frames, and door hardware to include gasketing systems, retainers and retainer covers, automatic or

fixed door bottoms, cam-lift hinges, thresholds, and sills, required to achieve specified performance requirements

1.4.2 Performance requirements: Sound Transmission Coefficient rating as given in the door schedule for installed assembly, when tested as operable door assembly in accordance with ASTM E 90 and ASTM E 413

1.5 SUBMITTALS

1.5.1 Submit under provisions of Section 013300

1.5.2 Product data: Indicate door materials and construction

1.5.3 Shop drawings: Indicate door opening criteria, elevations, sizes, types, swings; identify and detail cutouts

1.5.4 Quality assurance submittals:

1.5.4.1 Test Reports:

1.5.4.1.1 Certified laboratory reports, performed in accordance with ASTM E90 and ASTM E 413, from independent testing laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) supporting compliance of assemblies to specified requirements.

1.5.4.1.2 Minimum five (5) field tests, performed in accordance with ASTM E 336 and ASTM E 413 by five separate independent testing agencies, substantiating acoustical performance when installed at no less than seven (7) FSTC ratings below the specified STC rating

1.5.4.2 Certificates:

1.5.4.2.1 Contractor's certification that:

1.6.4.2.1.1 Products of this section, as provided, meet or exceed specified requirements

1.5.4.2.1.2 Manufacturer of products of this section meet specified qualifications

1.5.4.3 Manufacturer's instructions: Printed installation instructions for each component

1.5.5 Closeout submittals:

1.5.5.1 Warranty documents, executed by manufacturer in Owner's name

1.5.5.2 Operation and maintenance data for assembly components

1.5.5.3 Certified statement of manufacturer's authorized representative, as specified in FIELD QUALITY CONTROL Article of PART 3 of this section

1.5.5.4 Certified test reports of independent testing agency, as specified in FIELD QUALITY CONTROL Article of PART 3 of this section

1.6 QUALITY ASSURANCE

1.6.1 Qualifications:

1.6.1.1 Manufacturer: Minimum five (5) years documented experience producing systems specified in this section

1.6.1.2 Installer: Minimum five (5) years documented experience installing systems specified in this section, and approved by manufacturer

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1 Store frames in accordance with requirements of HMMA 840

1.7.2 Store steel doors in accordance with requirements of HMMA 840

1.7.3 Remove wraps or covers from doors and frames upon delivery at the building site; clean and touch-up scratches or disfigurement caused by shipping or handling promptly with rust inhibitive primer

1.7.4 Store units on planks or dunnage in a dry location; store doors in a vertical position spaced by blocking

1.7.5 Store units covered to protect them from damage, but permitting air circulation

1.8 SCHEDULING

1.8.1 Furnish manufacturer's mounting templates for door hardware specified in Section 087100 to manufacturer of products of this section in time for factory preparation for door hardware.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

2.1.1Basis of Design: Krieger Specialty Products

2.1.2 Alternates: Security Acoustics, Wenger Corp., IAC, Jamison Door Company

2.1.3.Unless otherwise specified for an individual product or material, supply all products specified in this section from the same manufacturer.

2.2 MATERIALS

2.2.1 Steel sheet: One of the following:

2.2.1.1 Cold-rolled steel sheet conforming to ASTM A 366, commercial quality.

1.2.1.2 Hot-rolled steel sheet conforming to ASTM A 569, pickled and oiled, commercial quality.

2.2.2 Galvanized steel sheet: ASTM A 653/A 653M, commercial quality, minimum G60 zinc coating.

2.2.3 Acoustical material: Manufacturer's standard for required STC rating.

2.2.4 Primer: Meeting ASTM B 117 salt spray for 150 hours, and ASTM D 1735 water fog test for organic coatings for 200 hours.

2.2.5 Glazing: Specified in Section 088000.

2.3 COMPONENTS

2.3.1 Steel doors: Fabricate in accordance with Architect-approved shop drawings, 1-3/4 inches minimum thickness, and as follows:

2.3.1.1 Face sheets:

2.3.1.1.1 Doors for interior use: Steel sheet, minimum 16 gage sheet thickness.

2.3.1.1.2. Visible seams on face sheets not permitted.

2.3.1.2 Core:

2.3.1.2.1 Stiffen face sheets with continuous vertical steel sections.

2.3.1.2.2 Fill spaces between stiffeners with acoustical material.

2.3.1.3 Vertical edges:

2.3.1.3.1 Join face sheets at vertical edges by continuous welding:

2.3.1.3.1.1 Join door faces by continuous weld on each edge, extending full door height.

2.3.1.3.1.2 Grind, fill, and dress welds to provide smooth flush surface.

2.3.1.3.2 Form edge profiles both vertical edges of doors with 1/8 inch in 2 inches bevel.

2.3.1.3.3 Visible seams on vertical edges not permitted.

2.3.1.4 Horizontal edges:

2.3.1.4.1 Close top and bottom edges of doors with continuous steel channels, 16 gage minimum; spot-weld channels to both door faces.

2.3.1.4.2 Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture

.

2.3.1.4.3 Provide additional flush closing channel at top edge of doors; spot-weld channel to both door faces.

2.3.1.5 Hardware preparation:

2.3.1.5.1 Mortise, reinforce, drill, and tap doors at factory for fully templated mortised hardware only, in accordance with approved hardware schedule and supplied templates.

2.3.1.5.2 Provide reinforcing plates at surface-mounted or non-templated hardware locations.

2.3.2 Frames: Fabricate in accordance with Architect-approved shop drawings, and as follows:

2.3.2.1 Frames for interior use: Fabricate from steel sheet, minimum 14-gage thickness.

2.3.2.3 Form frame members straight, and of uniform profile through lengths, as welded units with integral trim, of sizes and profiles indicated.

2.3.2.3.1 Weld contact edges of joints closed tight.
2.3.2.3.2 Miter perimeter trim faces and weld continuously.

2.3.2.4 When shipping limitations so dictate, fabricate frames for large openings in sections designed for assembly in the field; install alignment plates or angles, of same material and gage as frame, at each joint.

2.3.2.5 Hardware preparation:
.3.2.5.1 Mortise, reinforce, drill, and tap frames at factory for fully templated mortised hardware only, in accordance with Architect-approved shop drawings and supplied templates.

2.3.2.5.2 Provide reinforcing plates at surface-mounted or non-templated hardware locations.

2.3.2.6 Floor anchors:

2.3.2.6.1 Fabricate of same material as frame material; minimum 14 gage.

2.3.2.6.2 Weld anchors inside each jamb for floor anchorage.

2.3.2.7 Jamb anchors:

2.3.2.7.1 Fabricate of same material as frame material; weld anchors inside each jamb for wall anchorage.

2.3.2.7.2 Provide anchor types for indicated adjacent wall construction:

2.3.2.7.2.1 Frames for installation in masonry walls: Adjustable jamb anchors, 16 gage, T-shape type.

2.3.2.7.2.2 Frames for installation in stud partitions: Continuous 16 gage steel channel to surround stud, welded inside each jamb.

2.3.2.8 Plaster guards: Fabricate from minimum 22 gage steel; weld in place at hardware mortises on frames to be set in plaster, masonry, or concrete openings.

2.3.2.9 Provide welded frames with temporary steel spreader welded to jamb feet for bracing during shipping and handling.

2.3.3 Loose stops:

2.3.3.1 Fabricate of minimum 12 gage steel, with factory-drilled and countersunk holes for fasteners.

2.3.3.2 Form stops for mitered corner joints.

2.3.3.3 Supply cadmium-coated or zinc-coated fasteners, size and quantity required for fastener holes.

2.3.4 Door hardware:

2.3.4.1 Supply gasketing systems, retainers, retainer covers, automatic door bottoms, fixed door bottoms, cam-lift hinges, thresholds, and sills as indicated on Architect-approved shop drawings, or specified in manufacturer's product data for project conditions, to achieve specified performance requirements.

2.3.4.2 All other door hardware is specified in Section 087100.

2.4 SILL CONDITION

2.4.1 Where indicated on the drawings, furnish a smooth flush stainless steel or aluminum threshold for the door bottom to seal against when the door is in the closed position. The minimum width of the threshold shall be door thickness plus 4” to allow the threshold to extend a minimum of 1 ½” beyond the face of the door on both sides of the opening. For openings where carpet extends through the opening, the threshold height shall be 1/8” greater in height than the carpet thickness.

2.5 FINISH

2.5.1 Finish: All tool marks and surface imperfections shall be removed and exposed faces of all welded joints shall be dressed smooth. Assemblies shall be treated and shall be coated on all accessible surfaces with a rust-inhibitive primer which meets ASTM B117 salt spray for 150 hours, and ASTM D1735 water fog test for organic coatings for 200 hours, and which is fully cured prior to shipment.

2.5.2 Wood veneer covering shall be provided with all interior units. Submit color samples to the Architect before ordering. Veneer shall not exhibit wrinkles, folds or dimples. Exterior doors are not to be provided with wood veneer.

2.6 SOURCE QUALITY CONTROL

2.6.1 Hardware location on doors and frames:

2.6.1.1 Hinges:

2.6.1.1.1 Top: 5 inches from head of frame to top of hinge.

2.6.1.1.2 Bottom: 10 inches from finished floor to bottom of hinge.

2.6.1.2 Unit and integral type locks and latches: 38 inches from finished floor to centerline of knob.

2.6.1.3 Deadlocks: 48 inches from finished floor to centerline of strike.

2.6.1.4 Panic hardware: 950 mm from finished floor to centerline of cross bar, or as indicated on hardware template.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1 Verification of conditions:

3.1.1.1 Prior to installation, check and correct frames for size, swing, squareness, alignment, twist and plumb.

3.1.1.2 Verify openings are in accordance with approved shop drawings.

3.1.2 Installer's examination:

3.1.2.1 Have installer of this section examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.

3.1.2.2 Transmit two copies of installer's report to Architect within 24 hours of receipt.

3.1.2.3 Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.

3.1.2.4 Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 PREPARATION

3.2.1 Remove steel spreaders from welded frames prior to installation; use of spreaders for installation purposes not permitted.

3.3 INSTALLATION

3.3.1 Install units in accordance with approved shop drawings and manufacturer's printed installation instructions; in addition, install steel components in accordance with HMMA 840.

3.3.2 Oversize assemblies:

3.3.2.1 Weld field joints in accordance with AWS D1.1 and approved shop drawings.

3.3.2.2 Finish exposed field welds smooth; touch-up with rust inhibitive primer.

3.3.2.3 Ship Knock down to the jobsite prepared for field attachment by others.

3.3.3 Fill voids between concealed side of frame and adjacent wall construction with lightweight gypsum plaster in accordance with approved shop drawings or manufacturer's printed installation instructions.

3.3.4 Finish surfaces having abrasion damage smooth; touch-up with rust inhibitive primer.

3.3.5 Install gasketing systems, retainers, retainer covers, automatic door bottoms, fixed door bottoms, cam-lift hinges, thresholds, and sills in accordance with manufacturer's printed instructions.

3.3.6 Installation of all other door hardware is specified in Section xxxxxx

3.3.7 Field painting is specified in Section xxxxxx

3.3.8 Site tolerances: Do not exceed the following installation tolerances:

3.3.8.1 Squareness: Plus or minus 1/16 inch measured on a line, 90 degrees from one jamb, at the upper corner of the frame at the other jamb.

3.3.8.2 Alignment: Plus or minus 1/16 inch measured on jambs on a horizontal line parallel to the plane of the wall.

3.3.8.3 Twist: Plus or minus 1/16 inch measured at face corners of jambs on parallel lines perpendicular to the plane of the wall.

3.3.8.4 Plumb: Plus or minus 1/16 inch measured on the jamb at the floor.

3.4 FIELD QUALITY CONTROL

3.4.1 Engage and pay for the field services of manufacturer's authorized representative to:

3.4.1.1 Inspect completed installation of door and frame assemblies

3.4.1.2 Test all components through a minimum of ten complete cycles of operation

3.4.1.3 Verify each component is correctly installed

3.4.1.4 Direct installer in adjusting components for correct operation

3.4.1.5 Issue certified statement of compliance of installed door and frame assemblies to Architect-approved shop drawings.

3.4.1.6 Instruct Owner's maintenance personnel in correct operation and maintenance procedures for components of door and frame assemblies.

3.4.2 Engage and pay for the services of independent testing agency to:

3.4.2.1 Test door and frame assemblies selected by Owner or Architect in accordance with ASTM E 336.

3.4.2.2 Issue certified report documenting compliance of installed door and frame assemblies to specified acoustical performance requirements.

3.4.2.3 Any door assemblies that do not meet acoustical performance requirements will be fixed and retested at the Contractor’s expense.

END OF SECTION

SECTION 084113 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Aluminum doors, frames and framing.

B. Vision glass infill panels.

C. Perimeter sealant.

1.2 RELATED SECTIONS

A. Section 07900 – Sealants: System perimeter sealant and back-up materials.

B. Section 08800 – Glazing.

1.3 REFERENCES

A. AAMA - Metal Curtain Wall, Window, Store Front and Entrance _ Guide Specifications Manual.

B. AAMA 605.2 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

C. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

D. ANSI A117.1 - Safety Standards for the Handicapped.

E. ANSI/ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.4 SYSTEM DESCRIPTION

A. Aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory pre-finished, vision glass, related flashings, anchorage and attachment devices.

1.5 PERFORMANCE REQUIREMENTS

B. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as measured in accordance with ANSI/ASTM E330.

C. Limit mullion deflection to flexure limit of glass; with full recovery of glazing materials.

D. System to accommodate, without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

E. Limit air leakage through assembly to 0.06 of wall area, measured at a reference differential pressure across assembly of 1.57psf as measured in accordance with AAMA 501 ANSI/ASTM E283.

F. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 2.86 lbf/sq ft.

G. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

H. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental affect to system components.

I. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.6 SUBMITTALS

A. Submit under provisions of Section 01300.

B Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C Product Data: Provide component dimensions describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Conform to requirements of ANSI A117.1.

1.8 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years experience.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C) during and 48 hours after installation.

1.10 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

1.11 COORDINATION

A. Coordinate Work under provisions of Section 01039.

1.12 WARRANTY

A. Provide three year warranty.

B. Warranty: Include coverage for complete system for failure to meet specified requirements.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Kawneer.

B. Other acceptable manufacturers offering equivalent Products.

1. YKK.

2. Vistawall.

3. U.S. Aluminum.

C. Substitutions: Submit product literature to architect for review seven (7) days prior to bid.

2.2 MATERIALS

A. Stile and Rail Entrance Doors: Sizes, types and swings as indicated, equal to Kawneer Narrow Stile 1-3/4" thick standard aluminum entrance door, factory assembled and prepared for hardware. Bottom rail shall be as indicated. Stiles shall be beveled for SA doors. Join stiles and rails with welded interlocking joint, or with cadmium plated steel tie rods, to produce long-lasting joints which remain
rigid and tight when door is operated.

Weatherstrip exterior SA doors with Kawneer semi-rigid polymeric strips installed in face of stop and in meeting edge stiles. Seal sill with a blade gasket sweep applied to door bottom rail with concealed fasteners.

B. Entrance and Sidelight Frames: Unless otherwise shown, employ Kawneer series 451 flush exterior glazed tubing of 1/8" minimum thickness, 1-3/4" x 4½, complete with special shapes as required for a finished job. No face joints permitted in verticals except at expansion mulls. Sight lines on glazing members shall be consistent.

2.3 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in Section 08800.

2.4 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07900.

2.5 HARDWARE

A. Hardware for aluminum frames and doors furnished and supplied by the Aluminum Storefront Manufacturer.
1. Hinges : Intermediate Offset Pivot.

2.6 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.

2.7 FINISHES

A. Dark Bronze.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify site opening conditions under provisions of Section 01039.

B. Verify dimensions, tolerances, and method of attachment with other work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install flashings.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 08712 and 08721 for installation requirements.

L. Install glass in accordance with Section 08800, to glazing method required to achieve performance criteria.

M. Install perimeter sealant to method required to achieve performance criteria.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust work under provisions of Section 01700.

B. Adjust operating hardware for smooth operation.

3.5 CLEANING

A. Clean work under provisions of 01700.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01500.

B. Protect finished Work from damage.

END OF SECTION

SECTION 085113 ACOUSTICAL ALUMINUM WINDOWS

1.01 SUMMARY

Provide all labor, material and equipment necessary to furnish and install aluminum windows as shown on drawings and specifications herein. Window shapes and accessories as specified and detailed shall establish the type of units and materials to be used to provide the functional performance and aesthetic requirements desired. Details indicate the required depth and profile.

1.02 RELATED REQUIREMENTS

Section 01600 – Product Requirements

Section 07900 – Joint Sealers

Section 08800 – Glass and Glazing

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440-05 “Standard/Specification for Windows, Doors, and Unit Skylights”

B. AAMA 502 "Voluntary Specification for Field Testing of Newly Installed Fenestration Products"

C. AAMA 611 "Voluntary Specification for Anodized Architectural Aluminum"

D. AAMA 701/702"Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals”

E. AAMA 1503 “Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections”

F. AAMA 2603 “Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels”

G. AAMA 2604 “Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels”

H. AAMA 2605 “Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels”

I. ASTM E 90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions”

J. ASTM E 283"Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"

K. ASTM E 330"Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference"

L. ASTM E413 “Classification for Rating Sound Insulation”

M. ASTM E 547"Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential"

N. ASTM E966 “Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Facade Elements”

O. ASTM E1332-10a“Standard Classification for Determination of Outdoor-Indoor Transmission Class”

P. ASTM E1425“Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems”

Q. ASTM E 2190"Standard Specification for Insulating Glass Unit Performance and Evaluation"

R. ASTM F588 “Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact”

S. NFRC 100 “Procedure for Determining Fenestration Product U-Factors”

T. NFRC 200“Procedure forDeterminingFenestrationProductSolarHeatGainCoefficientand Visible Transmittance atNormal Incidence”

U. NFRC 500 “Procedure for Determining Fenestration Product Condensation Resistance Values”

1.04 PERFORMANCE REQUIREMENTS

A. Performance Requirements: As specified in Part 2 and with the following requirements.

B. Uniform Load Structural Test

1. With the primary sash in a closed position, and the secondary (exterior) set of sash in the full open position, test in accordance with ASTM-E-330. At a static air pressure difference of 60.0pounds per square foot with pressure applied both positively and negatively.

2. Static air pressure difference shall be 1.5 times the design pressure used in 1.03 A. (1.5 is the factor used to provide a margin of safety in aluminum windows and is the minimum recommended by the AAMA).

3. At conclusion of test, there shall be no glass breakage; permanent damage to fasteners, hardware parts, support arms, or actuating mechanisms, nor any other damage which would cause the window to be inoperable. Permanent deformation of any frame, sash, or ventilator member shall not exceed 0.04% of its span.

C. Air Infiltration

1. With primary sash in a closed and locked position, and the secondary (exterior) sash in the full open position, window shall be tested in accordance with ASTM-E283 and shall meet the following performance requirements.

a. Air infiltration on windows with less than 18 feet of operable sash crack perimeter shall not exceed 2.8 cfm per square foot of window area when tested in a static pressure drop of 1.57 psf (equivalent to 25 mph wind velocity) or 6.3 cfm total when tested at 6.24 psf (equivalent to 50-mph wind velocity).

b. Air infiltration on windows with 18 or more feet of operable sash crack perimeter shall not exceed .05 cfm per square foot of window area at a static pressure drop of 1.57 psf or .15 cfm at 6.24psf.

D. Water Resistance

1. With the primary set of sash in the closed and locked position, and the secondary (exterior) sash in the full open position, the window shall be subjected to a pressure drop of 8.00 psf. After passing first test, window may also be tested with both sets of sash closed and latched and shall be subjected to a minimum pressure drop of 12.00 psf. All tests shall be performed with the screen removed. Tests shall be conducted in accordance with ASTM-547.

E. Thermal Performance

1. When tested in accordance with AAMA-1503or according to NFRC-100 the thermal transmittance due to conduction (Uc) shall not exceed 0.57on the entire specimen.

2. When tested in accordance with AAMA-1503 or according to NFRC-500 the Condensation Resistance Factor (CRF) shall not be less than 58 on the entire specimen.

3. When tested in accordance with NFRC-200 the Solar Heat Gain Coefficient (SHGC) shall not exceed as specified .

F. Forced Entry Resistance

1. When tested in accordance with ASTM F 588, window shall perform to a minimum Performance Level 10.

G. Sound Transmission

1. Windows shall be fully assembled and glazed prior to testing. Acoustic performance based on glass performance alone or theoretical calculations will not be accepted.

2. Testing shall be performed in a NVLAP Certified Test Laboratory.

3. Sound Transmission Class (STC). Products shall be tested in accordance with ASTM E90-09and perform to a minimum STC-55.

4. Outdoor Indoor Transmission Class (OITC). Products shall be tested in accordance with ASTME90-09 and ASTM E1332-10a and perform to a minimum of OITC-30.

1.05 QUALITY ASSURANCE

A. All testing shall be performed by an independent architectural testing laboratory accredited by the American Architectural Manufactures Association (AAMA), the National Voluntary Laboratory Accreditation Program (NVLAP) and the International Conference of Building Officials (ICBO) and such other accreditation as may be required by state of local building regulations.

B. The manufacturer shall provide the architect and owner a notarized affidavit of compliance certifying that the doors furnished for this project are identical in every aspect of design, component parts (including sealants and the application thereof, reinforcing members, etc.) and fabrication techniques as the doors tested in the laboratory for which test reports have been furnished.

1.06 SUBMITTALS

A. Window manufacturer shall supply test reports from an AAMA- and NVLAP- accredited laboratory certifying compliance with performance specifications for each type of window supplied for this project.

B. Window manufacturer shall supply product data for each type of window required, including:

1. Construction details and fabrication methods.

2. Data on hardware and accessories.

3. Recommendations for maintenance and cleaning of exterior surfaces.

C. Before proceeding with the manufacture of windows, the window contractor shall submit complete shop drawings with installation details for the Architect's approval. These drawings shall also show window elevations, details of all window sections, collateral materials, details of anchorage, associated hardware.

D. Window manufacturer shall submit three [3] samples of finish.

E. Window manufacturer shall submit a copy of the product warranty to be applied to this project.

1.07 WARRANTY

A. The manufacturer shall warrant the product against material defects or defects in manufacturing. If a defect is discovered and brought to the attention of the Manufacturer, the defect will be corrected at no cost to the owner. Warranty shall not be pro-rated. Warranties requiring the owner to return windows to the factory for repair or replacement shall not be accepted.

1. Windows: warrant for Ten [10] years against defects in material or workmanship under normal use.

2. Insulating glass units: warrant seal for Ten [10] years against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.

3. Finish:

   Organic finish conforming to AAMA 2605-05: warrant for Ten [10] years against chipping, peeling, cracking, chalking, or fading.

Part 2 Products

2.01 MANUFACTURER

A. Basis of Design: St. Cloud Window, Inc., 390 Industrial Blvd., Sauk Rapids, MN 56379, Phone: 800-383-9311, Fax: 320-255-1513, www.stcloudwindow.com

1. SCW960 – Fixed Lite

B. Terminology used herein may include reference to that manufacturer's proprietary products. Such references shall be construed only for the purpose of establishing the quality of materials and workmanship to be applied under this section, and shall not be construed as limiting competition.

C. Requests for substitutions of products or manufacturers other than the Base Bid must be submitted to the Architect Seven [7] business days prior to the bid date. Requests for substitutions must demonstrate that the product seeking approval meets or exceeds the design and performance specifications of the Base Bid. Products not pre-approved by the Architect in writing via addendum will not be accepted. Substitutions must comply with the requirements of section 01600 – Product Requirements.

2.02 MATERIALS

A. Aluminum Extrusions

1. Shall be accurately extruded aluminum alloy 6063-T6.

2. All sash, screen, and frame members shall have a minimum wall thickness of 0.062.

3. Sill frame shall be constructed of extruded tubular shapes and shall include an aluminum closed weep system to prevent accumulation of water in sill. Tubular shapes that are formed by snapped-on or slide-together extrusions shall not be accepted.

4. Exterior and interior frame sill shall have a minimum slope of 5 degrees.

B. Insect Screen – Not applicable.

C. Thermal Barrier

1. All frame members shall be thermally broken by an extruded PVC thermal-barrier which shall provide complete metal-to-metal separation between the inner and outer frame members of not less than ¼". The thermal-barrier shall interlock to both halves of the frame, securely locking them together, though not inhibiting the expansion and contraction of either part. A bead of sealant shall be applied to the complete perimeter of the window to seal the joints between the frame and thermal-barrier. A poured and de-bridged thermal-barrier will not be accepted.

D. Gaskets

1. All corner joints of the master frame shall have neoprene gaskets to insure a weather-tight seal.

E. Weather-stripping

1. All sashes shall be double weather-stripped with 100% woven pile and Mylar center fins conforming to AAMA 701/702. Weatherstripping to be secured within extruded shapes of the aluminum profiles to prevent movement. Surface applied weather strip shall not be accepted.

F. Hardware

1. All interior sash rails shall have a spring-loaded extruded metal self-latching lock.

2. Sash Rollers: All horizontal rolling window sashes shall have a minimum of two sash rollers per sash made of Delrin material operating on a stainless steel axle. Rollers shall be recessed into the bottom sash rail so as not to protrude beyond the sash extrusion or weather-strip. Stainless steel rollers will not be accepted.

3. Balances: All sashes must be fully balanced with a minimum of two balances per sash. Balances are to be made of zinc die cast metal with nylon rollers. Balances must provide a positive lifting force through the full range of sash travel and hold the sash stationary at any open position without the use of auxiliary frictional devices or holding pins. Overhead balances and/or exposed balance cables or cords will not be acceptable. Balances are to be housed inside of jamb sash rails and made removable with the use of take-out clips for ease of replacement without the use of special tools.

G. Glazing

1. All glazing shall comply with the performance requirements outlined in section 08800 – Glass and Glazing

2. All operablesashes shall be marine-glazed with reusable flexible glazing vinyl.

3. All fixed glass to be set against sealant tape and wet sealed with a cap bead at the exterior. Interior lite to be dry sealed with a push-in glazing gasket.

4. Nominal glass thickness and type shall be:

a. Exterior glass lite

i) Thickness: 1/4" “Insulated Glass

ii) Tint: gray

iii) Type: annealed

b. Interior glass lite

i) Thickness: 1/4" Insulated Glass

ii) Tint: clear

iii) Type: annealed

iv) Coating: none

H. Muntin: Not applicable

I. Acoustic Liner

1. Each master frame shall have an acoustic liner consisting of an additional perimeter aluminum frame, lined with open-cell absorption foam and covered by a perforated aluminum cover. Acoustic liner shall surround the entire inside perimeter of the intermediate frame but shall not prevent or inhibit the exfiltration of moisture across the sill of the master frame. The open area of perforation shall be not less than 18 percent. Absorption materials within the acoustic liner or master frame that are comprised of cellulose or other organic materials shall not be accepted.

2.03 FABRICATION

A. Window shall consist of two separate frames permanently interlocked by a rigid vinyl thermal-barrier. All joints of the frame and sash shall be butt type, secured by means of thread-cutting type screws anchored into screw ports which shall be an integral part of frame members. All corner joints shall be joined neatly in a manner to provide weather-tight connection. Sash corners to be internally sealed. All sharp milled edges and corners of sash and screen frame shall be de-burred and made smooth. The meeting rail shall be of tubular construction, double weather-stripped and interlocked when in a closed position. Window unit is to be constructed in a manner that will facilitate the replacement of worn or damaged parts, hardware, or weather-strip.

2.04 FINISH

A. Interior:

Anodized Finish: Class I (etched and anodized to 0.7 mil), conforming to AAMA 611-98

Color to be: Dark Bronze

B. Exterior:

Anodized Finish: Class I (etched and anodized to 0.7 mil), conforming to AAMA 611-98

Color to be: Dark Bronze

Part 3 Erection

3.01 INSTALLATION

A. All window and related window components shall be installed in accordance with requirements of the owner and the approved shop drawings of the Manufacturer. Installation shall be by a contractor who is experienced and who shall document at least one other projects of similar nature and scope for which the window products were successfully installed.

B. All materials shall be erected plumb, level and true, relative to the building structure. The maximum variation from plumb and level shall not exceed 1/8” (plus or minus) over ten feet.

C. Approved insulation materials shall be installed in the frame cavity on the interior portion of the window frame. Area adjacent to the exterior of the window frame shall remain uninsulated. The window installer shall use caution in the insulation operation to avoid overlapping insulation materials across the thermal-barrier connector thus bridging the two separate frame members.

3.02 CALUKING

A. A grade "A" type urethane caulking compound: Pecora, Tremco, Vulkem, or equal as approved by the Architect, shall be applied per the installation drawings and details at all points where the aluminum master frame and/or panning intersects the masonry or other exterior wall finish. The caulking material shall be applied in a manner which insures a continuous air- and water-tight perimeter seal. Color to match the color of the aluminum windows unless specified otherwise by the Architect.

3.03 TESTING

A. Laboratory Testing

B. Field Testing

1. On-site testing shall be conducted at owner's discretion and expense. Up to three test specimens shall be selected by owner or architect.

2. On-site testing shall be conducted for air infiltration and water leakage as specified in section 1.04 – A and b, by an AAMA-certified architectural testing laboratory in accordance with AAMA 502, Method B.

3. On-site testing shall be conducted for sound transmission as specified in section 1.04 – F and G, by NAVLAP-certified acoustic testing laboratory in accordance with ASTM E966 and including flanking test. Using ASTM E413 and ASTM E1332, respectively, specimens tested in the field shall be within five (5) points of the laboratory STC test results and three (3) points of the laboratory OITC test results furnished with product qualification.

4. If a test specimen shall fail any aspect of the field test, it shall be repaired or replaced and re-tested. At the architect's direction, up to three (3) additional windows may be tested. Upon completion of re-testing, all window units shall be repaired or replaced in the same manner as the test specimen(s) to assure compliance with project performance specification.

5. The cost of re-testing and all subsequent repairs and other associated expenses shall be borne by the window manufacture and/or window contractor.

3.04 ADJUSTMENTS, PROTECTION, AND CLEANING

A. After installation, the erector shall remove all sealants, caulking and other misplaced materials from all surfaces, including adjacent work. The window frame, sash and glass shall be cleaned thoroughly with materials and methods recommended by the window and glass manufacturers and shall not cause any defacement of the work.

B. Installer shall make any and all adjustments to window sash and hardware to cause the operating sash to function properly and in accordance with the manufactures standards.

C. Protection of glass and window materials: Protect from contact with contaminating substances resulting from construction operations. After installation and cleaning of windows by window contractor, the general contractor shall be responsible for maintaining the cleanliness and protection of the window from damage from other trades.

D. Remove all sealant, caulking and other misplaced materials from all surfaces, including adjacent work. The window frames, casing, and glass shall be thoroughly cleaned with materials and methods recommended by the window and glass manufacturer and shall not cause any defacement of the work.

E. The general contractor shall be responsible for the protection of the work from damage by other trades.

SECTION 087100 DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hardware for wood and hollow metal doors.

B. Thresholds

C. Weatherstripping.

1.2 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Useable by Physically Handicapped People.

B. ANSI/NFPA 80 - Fire Doors and Windows.

C. AWI - Architectural Woodwork Institute.

D. BHMA - Builder's Hardware Manufacturers Association.

E. DHI - Door and Hardware Institute.

F. NAAMM - National Association of Architectural Metal Manufacturers.

G. NFPA 101 - Life Safety Code.

H. SDI - Steel Door Institute.

1.3 COORDINATION

A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

1.4 QUALITY ASSURANCE

A. Hardware Supplier: Company specializing in supplying commercial door hardware with three years documented experience. **Hardware supplier must be a direct distributor of all products furnished.**

B. Hardware Supplier Personnel: Must have in full time employment a certified Architectural Hardware Consultant (AHC) to assist in the work of this Section.

1.5 REGULATORY REQUIREMENTS

A. Conform to NFPA 80 code for requirements applicable to fire rated doors and frames.

B. Conform to the applicable sections of Chapter 5 of NFPA 101.

1.6 CERTIFICATIONS

A. Architectural Hardware Consultant shall provide hardware schedule and inspect complete installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions.

B. Provide two copies of certifications to Architect.

1.7 SUBMITTALS

A. Submit five copies of the schedule, shop drawings, and product data. All schedules shall be signed by an AHC who is employed full time by the finish hardware supplier.

B. Provide product data on specified hardware.

C. Submit manufacturer's parts lists, templates, and installation instructions.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site, store and handle as per manufacturer's recommendations.

B. Package hardware items individually, label and identify package with door opening code to match hardware schedule.

C. Protect hardware from theft by cataloging and storing in a secure area.

1.10 WARRANTY

A. Provide one-year warranty from the Date of Substantial Completion, except door closers shall be warranted for ten years.

1.11 MAINTENENCE SUPPLIES

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

2.1 ACCEPTABLE MANUFACTURERS

A.	Hinges:	Ives McKinney Hager
B.	Locks:	Stanley Best 45H Series, 06H Design Note: – No substitution allowed per Auburn University Standard
C.	Exit Devices:	Von Duprin 98 Series – No substitution allowed per Auburn University Standard
D.	Closers:	LCN 4000 Series – No substitution allowed per Auburn University Standard
E.	Flat Goods and Stops:	Ives Trimco Rockwood
F.	Weather Stripping and Thresholds:	Zero National Guard Pemko
G.	Continuous Gear Hinges	Ives Select Products Markar

G. All the above listed manufacturers and product numbers are those which are acceptable and approved for use on this project. Where allowed by the owner, substitute products will be considered provided that requests for substitution are made in writing to the Architect no less than 10 days prior to the original project bid date.

2.2 KEYING

A. All lock cylinders shall be keyed into the owner's existing Best master key system. Permanent cores shall be Stanley Best 7-pin key removable core. Furnished brass temporary construction use cores for all locks. Match existing key ways. The general contractor shall be responsible for removal of construction use cores and for the install of permanent cores. Brass construction cores shall be returned to the door hardware supplier by the general contractor. General contractor shall reimburse hardware supplier

for construction use cores not returned.

B. Supply keys in the following quantities: (stamp all keys with key symbol)

5 each - Master keys per group
3 each - Cut keys per cylinder
2 ea – control keys
12 each - Construction Master keys
2 each – construction control keys

C. Permanent cores and keys are to be shipped directly to owner using certified mail.

2.3 FINISHES

A. Finishes are identified in Schedule at end of this Section.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that doors and frames are ready to receive work and dimensions are as required.

B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and requirements of ANSI/NFPA 80, BHMA and DHI.

B. Use the templates provided by hardware item manufacturer.

C. Conform to ANSI A117.1 for positioning requirements for the handicapped.

D. All door closers shall be installed away from the corridor side of door to the maximum extent possible.

3.3 HARDWARE SETS

HW SET: 001

DOOR #(S):
008B

EACH TO HAVE:

1	EA	CONT. HINGE	224XY	628	IVE

1	EA	PANIC HARDWARE	98-L-F-06	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	4041 DEL EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 002

DOOR #(S):
104A

EACH TO HAVE:

1	EA	CONT. HINGE	224XY	628	IVE
1	EA	PANIC HARDWARE	98-L-BE-06	626	VON
1	EA	SURFACE CLOSER	4041 DEL EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 003

DOOR #(S):
004A

EACH TO HAVE:

2	EA	CONT. HINGE	224XY	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	KEYED REMOV MULL	KR4954	689	VON
1	EA	PANIC HARDWARE	RX-LC-98-EO-CON	626	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
1	SET	SEALS	8144S	BLK	ZER
1	EA	MULLION SEAL	8780N	BLK	ZER
2	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	65A MSLA-10	AL	ZER
1	EA	O H RAIN DRIP	142A	AL	ZER
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 004

DOOR #(S):
100A

EACH TO HAVE:

2	EA	CONT. HINGE	224XY	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	KEYED REMOV MULL	KR4954	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-DT-F-CON	626	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-F-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	SET	SEALS	8144S	BLK	ZER
1	EA	MULLION SEAL	8780N	BLK	ZER
2	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	8655A-E-BR-V3-226	A	ZER
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 005

DOOR #(S):
104B

EACH TO HAVE:

1	EA	CONT. HINGE	224XY	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	SET	SEALS	188S-HEAD	BLK	ZER
1	SET	SEALS	475AA-JAMBS	AL	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	8655A-E-BR-V3-226	A	ZER
1	EA	WIRE HARNESS	CON-12P		VON
1	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 006

DOOR #(S):
100C

EACH TO HAVE:

1	EA	CONT. HINGE	224XY	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-F-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	RAIN DRIP	142A	AL	ZER
1	SET	SEALS	188S-HEAD	BLK	ZER
1	SET	SEALS	475AA-JAMBS	AL	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	8655A-E-BR-V3-226	A	ZER
1	EA	WIRE HARNESS	CON-12P		VON
1	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 007

DOOR #(S):
008A

EACH TO HAVE:

2	EA	CONT. HINGE	224XY	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	KEYED REMOV MULL	KR4954	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-DT-F-CON	626	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-F-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
2	EA	ARMOR PLATE	8400 34” X 1" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MULLION SEAL	8780N	BLK	ZER
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 008

DOOR #(S):
100B 104B 104C

EACH TO HAVE:

2	EA	CONT. HINGE	224XY	628	IVE
1	EA	KEYED REMOV MULL	KR4954	689	VON
2	EA	PANIC HARDWARE	98-L-F	626	VON
2	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
2	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MULLION SEAL	8780N	BLK	ZER

HW SET: 009

DOOR #(S):
002A

EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	1461 EDA FC TBWMS	689	LCN
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 010

DOOR #(S):
005A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM	45H7D 15H	626	BES
1	EA	SURFACE CLOSER	1461 DEL EDA FC TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 011

DOOR #(S):
009A

EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	CARD READER LOCKSET			
		45HM7DEU15MS IDH MAX	626	BES	
1	EA	SURFACE CLOSER	1461 FC TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 012

DOOR #(S):
012A

EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	CARD READER LOCKSET			
		45HM7DEU15MS IDH MAX	626	BES	
1	EA	SURFACE CLOSER	1461 FC TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 013

DOOR #(S):
101B 101C 102A 108 109

EACH TO HAVE:

6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	FLUSH BOLTS	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	DEADBOLT	48H7K	626	BES
2	EA	PUSH PLATES	8200 4” X 16”	630	IVE
2	EA	PULL PLATES	8303 8” 4” X 16”	630	IVE
2	EA	SURFACE CLOSER	1461 DEL SHCUSH FC TBWMS	689	LCN
2	EA	ARMOR PLATE	8400 34” X 1" LDW	630	IVE
2	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE

2	EA	SILENCER	SR64	GRY	IVE

HW SET: 014

DOOR #(S):
016A

EACH TO HAVE:

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-F-CON	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	SURFACE CLOSER	1461 SCUSH FC TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

HW SET: 015

DOOR #(S):
009B 101A

EACH TO HAVE:
ALL HARDWARE PROVIDED BY DOOR SUPPLIER

HW SET: 016
DOOR #(S):
010A 011A 014A 015A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	OFFICE LOCK	45H7A 15H	626	BES
1	EA	MOP PLATE	8400 6" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 017
DOOR #(S):
101

EACH TO HAVE:
EXISTING HARDWARE TO BE RE-USED

HW SET: 018

DOOR #(S):
104D 110 114

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	OFFICE LOCK	45H7A 15H	626	BES
1	EA	SURFACE CLOSER	1461-DEL REG W/PA FC TBWMS	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 6" X 1" LDW	630	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 019 (STC RATED DOORS)

DOOR #(S):
103

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	45H7A 15H	626	BES
1	EA	WALL STOP	WS401CCV	626	IVE
1	SET	SEALS	BY DOOR MFG		
1	EA	THRESHOLD	BY DOOR MFG		

HW SET: 020 (STC RATED DOORS)

DOOR #(S):
102 105A 105B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	45H7R 15H	626	BES
1	EA	WALL STOP	WS401CCV	626	IVE
1	SET	SEALS	BY DOOR MFG		
1	EA	THRESHOLD	BY DOOR MFG		

HW SET: 021 (STC RATED DOORS)

DOOR #(S):
104A

EACH TO HAVE:

2	EA	CONT. HINGE	224XY	628	IVE
2	EA	PANIC HARDWARE	9827-L-F-LBR	626	VON
2	EA	RIM CYLINDER	1E72	626	BES
2	EA	SURFACE CLOSER	4041 DEL SCUSH TBWMS	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW	630	IVE
1	SET	SEALS	BY DOOR MFG		
1	EA	THRESHOLD	BY DOOR MFG		

COORDINATE HARDWARE WITH DOOR MFG TO MAINTAIN STC RATING.

HW SET: AL-01
DOOR #(S):
001A 103A 107

EACH TO HAVE:

2	EA	CONT. HINGE	112XY	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	KEYED REMOV MULL	KR4954	689	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-EO-CON	626	VON
1	EA	PANIC HARDWARE	RX-LC-EL-98-NL-OP	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	PULLS	8190HD-12-0	630	IVE
2	EA	SURFACE CLOSER	4041 TJ 18G TBWMS	689	LCN
2	EA	SURFACE CLOSERS	100S-SNB	630	GLY
1	SET	SEALS	BY FRAME/DOOR SUPPLIER	BLK	ZER
1	EA	MULLION SEAL	8780N	BLK	ZER
2	EA	DOOR SWEEP	381A	AA	ZER
1	EA	THRESHOLD	8655A-E-BR-V3-226	A	ZER
2	EA	WIRE HARNESS	CON-12P		VON
2	EA	WIRE HARNESS	CON-6W		VON
1	EA	POWER SUPPLY	PS914-4RL		VON
1	EA	CARD READER	PROVIDED BY OTHERS		

END OF SECTION

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Interior borrowed lights.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

B. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For installers, manufacturers of insulating-glass units with sputter-coated, low-e coatings, glass testing agency and sealant testing agency.

E. Product Certificates: For glass and glazing products, from manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass, glazing sealants and glazing gaskets.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

G. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Source Limitations for Glass: Obtain ultraclear float glass, coated float glass and insulating glass from single source from single manufacturer for each glass type.

E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

2.2 GLASS PRODUCTS

A. GL-1 Glass Units: General: 1” Thick Insulated Glass, Outboard layer to be tinted Low E glass and inboard layer to be clear glass.

B. GL-2 Glass Units: 1” Thick Insulated Low E Glass.

C. GL-E Glass Units: Acoustical Rated Glass. See Section 085113 Acoustical Aluminum Windows.

D. If needed, insert other types of proprietary or special gasket systems by naming manufacturer and product, if not specified in the Section where the window or glazed curtain-wall system is specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Sound Transmission Characteristics: For STC-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating, unless otherwise indicated.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.027 inch (0.7 mm).

B. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: As indicated on Drawings 0.0312 inch (0.79 mm) .

C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: As indicated on Drawings.
2. Depth: As indicated on Drawings.

2.3 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

C. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 098400 FABRIC WRAPPED ACOUSTICAL PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1 Section Includes: Custom fabricated acoustical wall panels.

1.2 REFERENCES

1.2.1 ASTM International:

1.2.1.1 ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

1.2.1.2 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2.1.3 ASTM E795 Standard Practices for Mounting Test Specimens During Sound Absorption Tests.

1.3 SYSTEM DESCRIPTION

1.3.1 Performance Requirements:

1.3.1.1 Surface Burning Characteristics (ASTM E84):

1.3.1.1.1 Flamespread: 25, maximum.

1.3.1.1.2 Smoke Developed: 450, maximum.

1.3.1.1.3 Fire ratings for all fabric covered panels is based on testing of the panel wrapped with the standard in stock fabric, Guilford of Maine, Model FR 701.

1.3.1.1.4 This rating applies to all acoustical wall treatment unless specifically excluded in the product specification section 2.02.

1.4 LOCATIONS

1.4.1 Units at or less than 9’0” AFF, Band Rehearsal Room and Goodwin Hall Renovations, impact-resistant units

1.4.2 Greater than 9’0” AFF, Band Rehearsal Room and Goodwin Hall Renovations, standard units

1.5 SUBMITTALS

1.5.1 General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

1.5.2 Product Data: Submit product data sheet, for specified products.

1.5.3 Shop Drawings: Submit shop drawings showing layout, edge profiles and panel components, including anchorage, accessories, finish colors and textures.

1.5.4 Samples: Submit selection and verification samples of finishes, colors and textures.

1.5.5 Test Reports: Certified test reports showing compliance with specified performance requirements.

1.5.5.1 Standard Systems: Submit certified copies of previous test reports substantiating

performance of system in lieu of retesting.

1.6 DELIVERY, STORAGE & HANDLING

1.6.1 General: Comply with Division 1 Product Requirements Section.

1.6.2 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

1.6.3 Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.7 PROJECT CONDITIONS

1.7.1 Environmental Requirements: Do not install panels until wet work, such as concrete and plastering, is complete; the building is enclosed; and the temperature and relative humidity are stabilized at 60 - 80 degrees F (16 - 27 degrees C) and 45%, respectively.

PART 2 - PRODUCTS

1.8 ACOUSTICAL WALL PANELS

1.8.1 Manufacturers:

1.8.1.1 Basis of Design: Conwed Designscape

1.8.1.2 Alternates: Decoustics, Kinetics Noise Control, AVL, Goterman & Sabo

1.9 MANUFACTURED UNITS

1.9.1 Size: As indicated on the drawings up to a maximum 48 inch (1219 mm) x 96 inch (2438 mm) panel.

1.9.2 Core: 2 or 4 inch (51 mm) thick fiberglass as noted on drawings, 5 – 7 pcf (48 kg/m^3) density.

1.9.3 1/8" impact-resistant layer for impact resistant units

1.9.4 Edge Detail: Pencil.

1.9.5 Facing: 100% polyester fabric, FR 701 Style 2100 by Guilford of Maine

1.9.6 Color: As indicated on the architectural drawings.

1.9.7 Sound Absorption (ASTM C423): Minimum Noise Reduction Coefficient of 0.95.

1.9.8 Mounting Accessories: Manufacturer's standard top mounted aluminum Z-clip mounting brackets.

1.10 FABRICATION

1.10.1 General: Treat fabric wrapped panels using heat shrink process to develop fully taut facing.

1.11 IMPACT RESISTANCE

1.11.1 All panels located below 7 feet a.f.f. are to have 1/8" fiberglass impact resistant layer.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

3.2.1 Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with

manufacturer’s instructions.

3.2.1.1 Verify that stud spacing is 16 inches (406 mm) oc, maximum, for panels installed over open studs.

3.2.1.2 Do not install panels until unsatisfactory conditions are corrected.

3.3 CLEANING

3.3.1 Follow manufacturer’s instructions for cleaning panels soiled during installation. Replace panels that cannot be cleaned to as new condition.

3.3.2 Keep site free from accumulation of waste and debris.

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Steel.
2. Galvanized metal.
3. Aluminum (not anodized or otherwise coated).
4. Plastic trim fabrications.
5. Exterior portland cement (stucco). (If applicable)
6. Fiberglass Fabrications(If applicable)

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
3. Division 09 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 12 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.

2. Coronado Paint.
3. Duron, Inc.
4. ICI Paints.
5. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E2.

2.4 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E1.

B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E1.

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.

2.5 METAL PRIMERS

A. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E1.

B. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

C. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E1.

D. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E1.

2.6 WOOD PRIMERS

A. Exterior Latex Wood Primer: MPI #6.

1. VOC Content: E Range of E1.

2.7 EXTERIOR LATEX PAINTS

A. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).

1. VOC Content: E Range of E1.

2.8 TEXTURED AND HIGH-BUILD COATINGS

A. Latex Stucco and Masonry Textured Coating: MPI #42.

1. VOC Content: E Range of E2.

B. High-Build Latex (Exterior): MPI #40.

1. VOC Content: E Range of E1.

2.9 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

1. VOC Content: E Range of E1.

2.10 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E1.

B. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Plaster: 12 percent.
5. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove surface oxidation.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete masonry units (CMU).
2. Steel.
3. Galvanized metal.
4. Aluminum (not anodized or otherwise coated).
5. Wood.
6. Gypsum board.
7. Plaster.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
3. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
4. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
5. Division 09 Section "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.

3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.

2. Coronado Paint.
3. Duron, Inc.
4. ICI Paints.
5. Sherwin-Williams Company.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when

calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Non-flat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1,2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.

s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E2.

2.4 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: E Range of E1

B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.5 METAL PRIMERS

A. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E1.

B. Rust-Inhibitive Primer (Water Based): MPI #107.

1. VOC Content: E Range of E1

C. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

D. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E1.

E. Vinyl Wash Primer: MPI #80.

1. VOC Content: E Range of E2.

F. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E1.

2.6 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

1. VOC Content: E Range of E1.

2.7 LATEX PAINTS

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 0.5.

B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

C. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

D. Interior Latex (Satin): MPI #43 (Gloss Level 4).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.5

E. Interior Latex (Semi-gloss): MPI #54 (Gloss Level 5).(If applicable or shown on drawings)

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 2.

F. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg). (If applicable or indicated on drawings)

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 2

G. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4

H. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).

1. VOC Content: E Range of E3.

2. Environmental Performance Rating: EPR 4.5.

I. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 4.5.

J. Institutional Low-Odor/VOC Latex (Semi-gloss): MPI #147 (Gloss Level 5).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

K. High-Performance Architectural Latex (Low Sheen): MPI #138 (Gloss Level 2).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 4.

L. High-Performance Architectural Latex (Eggshell): MPI #139 (Gloss Level 3).

1. VOC Content: E Range of E2
2. Environmental Performance Rating: EPR 5

M. High-Performance Architectural Latex (Satin): MPI #140 (Gloss Level 4).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 4.5

N. High-Performance Architectural Latex (Semi-gloss): MPI #141 (Gloss Level 5).

1. VOC Content: E Range of E1
2. Environmental Performance Rating: EPR 5.

O. Exterior Latex (Flat): MPI #10 (Gloss Level 1).

1. VOC Content: E Range of E1.

P. Exterior Latex (Semi-gloss): MPI #11 (Gloss Level 5).

1. VOC Content: E Range of E1.

Q. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

1. VOC Content: E Range of E1.

2.8 ALKYD PAINTS

A. Interior Alkyd (Semi-gloss): MPI #47 (Gloss Level 5).

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 1.

2.9 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

1. VOC Content: E Range of E1.

2.10 FLOOR COATINGS

A. Interior Concrete Floor Stain: MPI #58.

1. VOC Content: E Range of E1.
2. Environmental Performance Rating: EPR 2.

B. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

1. VOC Content: E Range of E1.

C. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.

F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. **Prime edges, ends, faces, undersides, and backsides of wood.**
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

L. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.

M. Spray-Textured Ceiling Substrates: Do not begin paint application until surfaces are dry.

N. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099123

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Sections include the following:

1. Division 05 Section "Cold-Formed Metal Framing" for load-bearing steel framing that supports gypsum board.
2. Division 06 Section "Sheathing" for gypsum sheathing.
3. Division 07 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
4. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
5. Division 09 painting Sections for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Gypsum Co.
b. G-P Gypsum.
c. National Gypsum Company.
d. USG Corporation.

B. Gypsum Board: Type X gypsum board.

1. Core: 5/8" (15.9 mm), Type X.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces. Use on all Toilet/Shower Room walls that are not receiving porcelain tile.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

a. Cornerbead.
b. Casing bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.

5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels and Wet Locations:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: (If Applicable) Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Type X: As indicated on Drawings.
   2. Ceiling Type: As indicated on Drawings.
   3. Type X: Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated.
   3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.Insert specific requirements for particular substrate in paragraph below.
   4. .

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect

C. Interior Trim: Install in the following locations:

   1. Cornerbead: Use at outside corners
   2. LC-Bead: Use at exposed panel edges
   3. L-Bead: Use where indicated
   4. U-Bead: Use where indicated

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.

2. Level 4: At panel surfaces that will be exposed to view.

a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 – TILING (PCT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Porcelain ceramic tile floor base and wall thin set application method.
2. Thresholds at door and cased opening applications.

B. Related Sections:
1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Division 09 Section "Gypsum Board" for cementitious backer units and water-resistant backer board.

1.3 DEFINITIONS

A. 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.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Stone thresholds in 6-inch (150-mm) lengths.

E. Qualification Data: For qualified Installer.

F. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

G. Product Certificates: For each type of product, signed by product manufacturer.

H. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. 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.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.

D. Pre-installation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: 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.

1.8 EXTRA MATERIALS

A. Furnish extra materials of the same shade and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. 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.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces. Follow all manufacturers' instructions regarding protection.

2.2 TILE PRODUCTS

A. Tile Type: PCT-1 (Floor & Wall Tile)

1. Basis-of-Design Product: Subject to compliance with requirements, provide, STONEPEAK – SIMPLY MODERN COLLECTION or approved equal prior to bid.

2. Composition: Porcelain.

3. Module size: 12 x 24.

4. Color: As selected by Architect from manufacture's full range.

5. Grout: 1/8" size, Color as selected by Architect from manufacturer's full range.

6. Trim Units: Provide shapes as indicated in Construction Documents.

2.3 THRESHOLDS

B. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

C. Quartz Thresholds: ASTM C 615, with honed finish.

1. Description: Color as selected from manufacturer's full range.

2.4 SETTING MATERIALS

D. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.- Need Medium bed for tiles larger than 16" on one side.

1. Basis of Design: Laticrete 4XLT or approved equal prior to bid from one of the following manufacturers:

    a. Bonsal American; an Oldcastle company.
    b. Bostik, Inc.
    c. Custom Building Products.
    d. Laticrete International, Inc.
    e. MAPEI Corporation.
    f. Southern Grouts & Mortars, Inc.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

2.3 GROUT MATERIALS

A. Epoxy Grout:

1. Basis-of-Design Product: Subject to compliance with requirements, Laticrete Spectralock or comparable product.

B. Urethane Grout:

1. Basis-of-Design Product: Subject to compliance with requirements, PermaColor or comparable product.

2.4 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

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. DAP Inc.; Titanium Enriched Kitchen and Bath Sealant.

b. Dow Corning Corporation; Dow Corning 786.
c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
f. Tremco Incorporated; Tremsil 600 White.

2.5 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

C. 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.

D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

E. Fluid Applied Waterproofing must be applied & tested under all tile that is not slab on grade.

2.6 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. 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.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. 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.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors in laundries. (If Applicable)
    c. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.

B. 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.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern unless otherwise 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.

1. 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.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. 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.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Floor Tile: 2 mm on same size tile; 3mm on mixed sizes.
2. Porcelain Wall Tile: 2mm on same size tile; 3mm on mixed sizes.
3. Retain first paragraph below for wainscots. Verify that instruction agrees with detailing.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated. Provide joint layout via submittal for architects approval.

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove urethane grout residue from tile as soon as possible.
2. 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.
3. 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.

B. 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.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093000

SECTION 093050 - TILE SETTING MATERIALS AND ACCESSORIES

PART 1 GENERAL

1.0 GENERAL: Products listed in this specification are Basis-of-Design products. All other manufacturers must be approved prior to bid. Waterproofing systems described within shall be obtained from a single manufacturer for a complete system warranty.

1.1 SECTION INCLUDES

A. Edge-protection and transition profiles for floors.

B. Finishing and edge-protection profiles for walls and countertops.

C. Wall access panel system.

D. Movement joint and cove-shaped profiles.

F. Modular screed system.

G. Uncoupling membrane.

H. Waterproofing Membrane.

I. Floor drain, with integrated bonding flange.

J. Shower waterproofing: prefabricated substrates, waterproofing membrane, floor drain with integrated bonding flange, and sealant.

K. Drainage membranes.

L. Setting materials: adhesives, mortars, grouts, and sealants.

1.2 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete.

B. Section 055500 – Metal Fabrications

C. Section 061053 – Miscellaneous Rough Carpentry

D. Section 079200 - Joint Sealants

E. Section 092900 - Gypsum Board

F. Section 093000 - Tiling

G. Section 220440 - Plumbing Fixtures

1.3 REFERENCES

A. CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

B. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

C. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

D. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.4 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3.Installation methods.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

C. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

E. Preinstallation Conference: Conduct conference at the Project site.

1. Convene one week prior to commencing work of this section.

2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.

3. Meeting agenda includes but is not limited to:

A. Surface preparation.

b. Tile and installation material compatibility.

c. Edge protection, transition and pre-fabricated movement joint profiles.

d. Waterproofing techniques.

e. Crack isolation techniques.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1.Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901 5841. ASD. Tel: (800) 472-4588. Fax (800) 477-9783. E-mail: specassist@schluter.com. Web: www.schluter.com. (Basis of Design)

2. LaticreteIntenations, Inc., One Laticrete Park North, Bethany, Ct 06524-3423; Tel: (800) 243-4788

3. USG (Durock Shower System). Phone: 800-874-4968.

2.2 UNCOUPLING MEMBRANE FOR ALL BATHROOM FLOORS WITH PCT FINISH

A. Schluter-DITRA

1. Description: 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane with a grid structure of 1/2 inch by 1/2 inch (12 mm by 12 mm) square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to its underside. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation and is listed by cUPC to meet or exceed the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10 and is listed by cUPC, and is evaluated by ICC-ES (see Report No. ESR-2467).

2. Waterproofing seaming membrane:

a. Provide KERDI BAND Seams and Corners material 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.

B. Pre-fabricated Movement and Expansion Joints

1. Prefabricated Corner Movement and Expansion Joints: Schluter®- DILEX DILEX-EKE prefabricated extruded rigid PVC joined by a soft CPE movement joint material. Profile includes integral perforated anchoring legs with trapezoidal openings. Height and color as required. Prefabricated Field Movement and Expansion Joint: Schluter®-DILEX DILEX-BWS, DILEX BWB, DILEX AKWS, and DILEX KS pre-fabricated extruded rigid PVC roll-formed stainless steel, or extruded aluminum profile, joined by a soft CPE movement joint material. Profile includes integral perforated anchoring legs with trapezoidal openings. Height and color as required.

C. Finishing and Edge-Protection Profiles for ceramic and stone tile base

1. Finishing and edge-protection profile: Schluter®-RONDEC ; roll-formed stainless steel, Anodized Aluminum, or Color Coated Aluminum edge protection profile with integral perforated anchoring leg with trapezoidal openings, Material and finish as indicated; height as required.

2.4 FLOOR DRAIN WITH INTEGRATED BONDING FLANGE

A. Schluter-KERDI-DRAIN, Stainless Steel:

1. Description: stainless steel floor drain 9-27/32 inch (250 mm) diameter integrated bonding flange with 3 inch (75 mm) no-hub outlet, and grate assembly. Grate assembly includes stainless steel grate, height adjustment collar, and lateral adjustment ring with trapezoid perforations.

2. Drain listed by UPC to meet requirements of "International Association of Plumbing and Mechanical Officials Interim Guide Criteria for Floor Drain with Integrated Bonding Flange" (IGC 195), listed by CSA to meet requirements of the Canadian Standards Association standard, "Floor, Area, and Shower Drains, and Cleanouts for Residential Construction" (CSA B79), Drain detail as referenced in method B422 of the Tile Council of North America Handbook for Ceramic Tile Installation.

3. Drain Housing
Material: a.Stainless Steel.

4. Grate Material and Finish:

a. E - Stainless Steel Type 304 = V2A.

5. Nominal Grate Size:
a. 6 inch (150 mm) by 6 inch (150 mm) square.

2.6 FINISHING AND EDGE-PROTECTION PROFILES

A. Schluter-BARA-RW

1. Description: L-shaped profile with a 3-1/2 inch (90 mm) wide integrated trapezoid-perforated anchoring leg.

a.Provide with straight anchoring leg.

b. Provide with special radius anchoring leg for radius applications.

c. Provide with matching connector.

2.Material and Finish:
a.E - Stainless Steel Type 304 = V2A.

1) Height as required.

2.7 SETTING MATERIALS

A. Installation methods as specified in Section 093000 – Tile.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of Unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 093050

SECTION 096519 - RESILIENT TILE FLOORING (LVT)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile (LVT)

B. Product Data: For each type of product indicated.

C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

D. Samples: Full-size units of each color and pattern of floor tile required.

E. Maintenance data.

1.2 QUALITY ASSURANCE

A. ATM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

C. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

D. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.

E. ASTM F 1700 Standard Specification for Solid Vinyl Tile

F. ASTM F 1861 Standard Specification for Resilient Wall Base

G. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

H. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

I. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials.

1.3 PROJECT CONDITIONS

A. Maintain a minimum ambient temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 C) and a maximum temperature of 100 degrees F for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55 degrees in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. .

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's ordering instructions and lead time requirements to avid construction delays.

B. Deliver materials in good condition to the jobsite in the manufacture's original unopened containers that bear the name and brand of the manufacturer, product identification, and shipping and handling instructions.

C. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in spaces where they will be installed for at least 48 hours before beginning installation.

1.5 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Limited Warranty Period: 20 years.

C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. For the Limited Warranty to be valid, the product is required to be installed using the appropriate manufacturer's installation system. Product installed not using the specific instructions from the manufacturer will void the warranty.

1.6 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.

2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 - PRODUCTS

2.1 SOLID VINYL FLOOR TILE (Plank Style) LVT-1

A. Basis-of-Design: Subject to compliance with requirements, Armstrong Flooring, Inc. NATURAL CREATIONS. Approved equals will be considered provided substitution request are received by the architect at seven days prior to bid date.

B. Tile Standard: ASTM F 1700.

1. Class: Class III, printed film vinyl tile.
2. Type: Type B, embossed surface.

C. Wear Layer Thickness: .20 mil Wear Layer (+/- 0.005 in.)

D. Thickness: 1/8".

E. Size: 6" x 36."

F. Colors and Patterns: Color selected from manufacturer's standard range of colors.

2.2 ADHESIVES

A. Provide Armstrong S-288 Flooring adhesive or equal product under the flooring.

2.3 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors, provide Armstrong S-184 Fast-Setting Cement -Based Patch and Underlayment.

B. Provide transition/reducing strips tapered to meet abutting materials.

C. Provide threshold of thickness and width as shown on the drawings.

D. Provide metal edge strips of width required and of required thickness to protect exposed edges of the flooring. Provide units of maximum length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTION

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests, bond test, pH test, etc.).

B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.

C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.3 PREPARATION

A. Subfloor Preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects as recommended by the flooring manufacturer. Refer to manufacture's manual and ASTM F 710 Standard Practice

for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

B. Subfloor Cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material. Refer to the manufacturer's manual and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

C. Perform subfloor moisture testing in accordance with one of the following as recommended by the manufacturer , "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes,"ASTM F 1869,"Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride", and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80%.MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D.Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay planks square with room axis. (Verify with Designer)

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, non-staining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096519.02 - RESILIENT TILE FLOORING AND RESILIENT BASE

PART 1 - GENERAL

1.1 SUMMARY

Section Includes:

1. Vinyl composition floor tile.

2. Rubber Base.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

C. Samples: Full-size units of each color and pattern of floor tile required.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE Copy this article and re-edit for each product.

A. Products: Subject to compliance with requirements, provide one of the following:
1. Armstrong World Industries, Inc.: Standard Excelon Imperial Texture.
2. Mannington Mills, Inc.: Essentials.
3. Tarkett, Inc.: Colorworks.

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 1/8".

E. Size: 12 by 12 inches.

F. Resilient Wall Base: Provide rubber base, with matching end stops and preformed or molded corner units, and as follows:
1. Manufacturers: Provide products complying with requirements of the Contract documents and made by one of the following:
a. Armstrong World Industries, Inc.
b. Flexco, Inc,
c. Roppe Corp.
d.Johnsonite.
2. Height: 4 inches.
3. Thickness: 1/8 inch.
4. Styles: Standard top-set cove and straight base without cove, as required for locations indicated on the drawings.
5. Finish: Matte.
6. Outside Corners: Preformed.
7. Inside Corners: Job formed.
8. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by floor covering manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis or if indicated differently on drawings.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction or in pattern of colors and sizes indicated on drawings.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical tiles and suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.

C. Samples: For each exposed finish.

D. Product test reports.

E. Research/evaluation reports.

F. Maintenance data.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

    a. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.

    a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Comply with the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
5. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Expansion anchors fabricated from corrosion-resistant materials, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory

devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

E. Seismic struts and seismic clips.

F. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING

A. Basis for design:
ACT-1: ACT-2: Armstrong 1728
ACT -2: USG Brand Lay-In Gypsum Ceiling Panels.

or equal products by:
1. USG Interiors, Inc.
2. Celotex

B. Classification: Provide tiles complying with ASTM E 1264 for type and form as follows:

1. Type III, mineral base with painted finish; Form 2, water felted.
2. Type and Form: Type IV; pattern E

C. Color: White.

D. LR: Not less than .80.

E. CAC: Not less than 40.

F. Thickness: 5/8 inch.

G. Modular Size: 24”x 24”.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong XL Prelude 15/16” or a comparable product by one of the following:

1. USG Interiors, INC.

2. Celotex

B. Direct-Hung Suspension System: Intermediate-duty structural classification.

C. Access: Downward, with each access unit identified by manufacturer's standard unobtrusive markers.

2.4 EXTRUDED ALUMINUM PERIMETER TRIM:

A. Equal to Armstrong Axiom Classic. See drawings for locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
2. Do not attach hangers to steel deck tabs or to steel roof deck.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

END OF SECTION 095123

SECTION 095316 CURVED PROFILE CEILING SUSPENSION CLOUDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:
   1. Cloud suspension system.
   2. Metal ceiling panels.
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:
   1. Section 095123 – Acoustical Ceilings
   2. Section 092900 – Gypsum Board
   3. Divisions 23 (15) – HVAC
   4. Division 26 (16) Sections - Electrical Work

C. Alternates
   1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than Seven(7) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products which have not been approved by Addenda, the specified products shall be provided without additional compensation.
   2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet a ll requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
   2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   3. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   4. ASTM A 1008 "Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability"
   5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1264 Classification for Acoustical Ceiling Products.
9. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
B. Samples: Minimum 3 inch x 3 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items that are to be coordinated with, or supported by the ceilings.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
      a. Flame Spread: 25 or less
      b. Smoke Developed: 50 or less
C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
B. Before installing ceiling units, permit them to reach room temperature and a stabilized moisture content.
C. Handle ceiling units carefully to avoid any distortion or damaged units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.8 WARRANTY

A. Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
   1. Panels: Sagging and warping
   2. Grid System: Rusting and manufacturer's defects
B. Warranty Period:
   1. Panels: Thirty (10) years from date of substantial completion.
   2. Grid: Thirty (10) years from date of substantial completion.
   3. Panels and grid systems with HumiGuard Plus performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.
C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Metal Panels:
   1. Armstrong World Industries, Inc.

B. Suspension System:
   1. Armstrong World Industries, Inc.

2.2 METAL ACCENT CLOUD PANELS

A. Panels Type ACT-1:
   1. Patterns:
      l. Unperforated Panel (UPA)
   2. Composition: Aluminum panels
   3. Color:
      a. Wood Look Architectural Film Color option: Light Cherry
   4. Cloud Size: 6' x 6'
   5. Edge detail: Concealed grid components with 1/4 inch black reveal between panels.
   6. Arc Dimensions: 30°
   7. Flame Spread: Class A as per ASTM E 1264
   8. Acoustical Absorption (ASTM C423), Sabins/square foot: _____
   9. Acceptable Product: (SV300606UPALC) as manufactured by Armstrong World Industries.

B. Accessories
   1. Acoustical Fleece laminated backing (white) (black)
   2. Infill Panel (fiberglass infill) #820-01-00

2.3 KIT SUSPENSION SYSTEM

A. Components: Main beams fabricated from painted commercial quality extruded aluminum, cross tee base metal and end detail are fabricated from commercial quality hot dipped

galvanized steel complying with ASTM A 653. Concealed main beams have a 15/16" type flange design.

1. Color: (Grid Color selected on form) and match the actual color of the selected ceiling tile, unless noted otherwise.
2. Serpentina Waves main beams 6 foot long curved to 30° degree arcs, hung 24" or 48" OC.
3. Serpentina Semi-concealed Connector Cross Tee (SCXT24MR)
4. Serpentina Waves Connector Sleeves: Slip over flange of main beams:
    a. 6 foot sleeve (SPTCS6)
5. Corner Post (SPTOSCP): Pre-assembled corner
6. Serpentina Trim Clip (AXCCLT): Factory installed twist-in clip with pre-punched holes for attachment of cross tees to perimeter trim.
7. Splice Plates (SPTSPLICE): used to align and secure joints between sections of Serpentina Perimeter Trim. One splice plate needed for each joint.
8. Serpentina Perimeter Hold Down Clips (AX-SPT-HDC): as needed to maintain contact between panel and trim.
9. Strong Back: Used for aid stability and squaring of the system during installation. Also eliminates hanger wires on perimeter cross tees. Note: Hanger wires are still to be attached to the main runners, not the StrongBack.

C. Edge Moldings and Trim:
    1. Serpentina Perimeter Trim:
        a. (SPTSTR) 1 foot – 12 foot straight trim to close ends
        b. (___H/V PT) curved for parallel attachment to main beams

D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

E. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Coordinate panel layout with mechanical and electrical fixtures.
B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
    1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Install suspension system and panels in accordance with manufacturer's instructions and in compliance with ASTM C 636 and with the authorities having jurisdiction.
   1. Serpentina Waves Kits (LA297912)
B. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.
C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
D. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
E. Corrugated panels are to be field attached to the perimeter trim and main beams approximately every 9" or every fourth rib that touches the trim or main beam. Attachment is made using the supplied rivets or screws. Care should be given to properly align the panels before attachment takes place.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.
B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes modular, tufted carpet tile.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show the following:

1. Existing flooring materials to be removed.
2. Existing flooring materials to remain.
3. Carpet tile type, color, and dye lot.
4. Pattern of installation.
5. Insets and borders.
6. Edge, transition, and other accessory strips.
7. Transition details to other flooring materials.

C. Samples: For each color and texture required.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

E. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Mockups: Before installing carpet tile, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.6 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and de-lamination.

1. Warranty Period: Lifetime.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis of design- subject to compliance with requirements.

1. Carpet Tile

    a. Color: As selected by Architect from manufacturer's full range.
    b. Pattern: Linen 2.0.
    c. Source: Milliken or approved equals from Tandus or J&J Invision.

B. Fiber Content: 100 percent nylon 6, 6

C. Pile Characteristic: Level-loop, multi-colored.

D. Density: 6,583 (average)

E. Pile Thickness: 0.35 inches nominal

F. Stitches: 10.3 stitches per inch.

G. Gauge: 1/10 per inch.

H. Surface Pile Weight: 20 oz./sq. yd.

I. Total Weight: 104.0 oz./sq. yd. for finished carpet tile.

J. Primary Backing: Manufacturer's standard composite materials

K. Secondary Backing: Comfort Plus ES System (or equal).

L. Retain one or both paragraphs above or first paragraph below to describe backing system.

M. Size: 1 meter x 1 meter.

N. Applied Soil-Resistance Treatment: StainSmart or approved equal.

O. Antimicrobial Treatment: AlphaSan or approved equal.

P. Performance Characteristics: As follows:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
2. Dry Breaking Strength: Not less than 100 lbf (445 N) per ASTM D 2646.
3. Tuft Bind: Not less than 8 lbf (36 N) per ASTM D 1335.
4. De-lamination: Not less than 2.5lbf/in. per ASTM D 3936.
5. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
6. Dimensional Stability: 0.2 percent or less per ISO 2551 (Aachen Test).
7. Noise Reduction Coefficient (NRC): .25 NRC per ASTM C 423.
8. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.

9. Colorfastness to Light: Not less than 4 after 80 hours AFU (AATCC fading units) per AATCC 16, Option E.
10. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.
11. Electrostatic Propensity: Less than 3.5 kV per AATCC 134.
12. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.
13. Texture Appearance Retention Rating (TARR) for severe traffic end use application.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

C. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

D. Install pattern parallel to walls and borders. Monolithic installation.

END OF SECTION 096813

SECTION 098100 BLACK ACOUSTIC INSULATION

Part 1 General

1.1 Section Includes

1.1.1 Black Acoustic Insulation
1.1.2 Impaling Pins and Associated Hardware
1.1.2 Location: Underside of roof deck, band rehearsal hall – three layers of 2" thick units, total composite thickness 6" and 2 layers on walls where indicated, total composite thickness of 4".

1.2 Related Sections

1.2.1 Section 05300 - Metal Decking: Surface attachment to underside of metal deck for improved sound absorption.

1.3 References

1.3.1 ASTM C423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
1.3.2 UL 723 - Test for Surface Burning Characteristics of Building Materials.
1.3.3 ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

1.4 Performance Requirements

1.4.1 Product thickness shall be three layers of 2" thick material, totaling 6" of thickness, and in density of 3.0 pcf. (Type CB600).

1.4.2 Product shall be dimensionally stable with no capability for shrinking or warping.
1.4.3 Product shall have a resilient composition with good resistance to damage from job-site impact.
1.4.4 Product shall be composed of inorganic glass fibers.

1.4.5 Product shall not be susceptible to rot or mildew contamination.
1.4.6 Product shall not cause corrosion greater than caused by sterile cotton to steel and aluminum, when tested in accordance with ASTM C665.
1.4.7 Acoustical Performance (Tested to ASTM C423, Type A mounting).

		Thickness	Octave Band Center Frequencies, Hz						
			125	250	500	1000	2000	4000	NRC
		6.0"	0.40	0.85	0.95	1.00	0.95	0.95	0.93

1.4.8 Surface Burning of Core Material (tested to UL 723, or CANIULC-S102-M):

Flame spread 25, smoke developed 50(Class A).

1.4.9 Water vapor sorption - by weight (Tested to ASTM C1104):
<3% at 120°F (49°C) at 95% relative humidity.

1.4.10 Fungi resistance
Meets all requirements of ASTM C1338.

1.5 Submittals

1.5.1 Product Data: Submit to requirements of Section **01XXX**.

1.5.2 Product Data: Manufacturer's descriptive literature, including component item data, physical sizes, material densities, fastening and attachment methods.

1.5.3 Samples:
1.5.3.1 Submit to requirements of Section **01XXX.**
1.5.3.2 Submit two samples, 125mm x 250mm (6" x 10").

1.5.4 Manufacturer's Certificate: Provide to requirements of Section **01XXX** that products meet or exceed specified requirements.
1.5.4.1 Certify system acoustical and fire resistance performance.
1.5.4.2 Certify that installers have been trained and are qualified to install the system.

1.5.5 Manufacturer's Installation Instructions: Provide to requirements of Section **01XXX**.

1.6 Quality Assurance

1.6.1 Installer: Experienced in the installation of building insulation and acoustical materials.

1.6.2 Test Reports: Submit tests reports from a NVLAP accredited testing laboratory indicating that the system has passed all noted fire resistance requirements and acoustical requirements.

1.7 Regulatory Requirements

1.7.1 Conform to applicable code for fire rated panel construction and combustibility requirements for materials.

1.8 Delivery, Storage And Handling

1.8.1 Inspect material upon arrival to the site. Immediately log damaged materials with the shipping company and report to the manufacturer. Report flaws or defects in the material to the manufacturer within 24 hours of delivery.

1.8.2 Store material in a secure, dry, clean, and dust free environment away from high traffic areas. Store material in such a manner to prevent damage to insulation core or mat faced finish. (Do not pile material on top of other components.)

1.8.3 Keep material in its original packaging until installation.

Part 2 Products

2.1 Basis of Design Manufacturer

2.1.1 Basis of Design: Owens Corning “Select Sound Black Acoustic Board

2.1.2 Equivalent: Certainteed “Certa-Pro Black Acoustic Board

2.1.3 Impaling Pins: SF Products, Atlanta, Georgia (www.sfproducts.com)
Alternate: Owens Corning Company

Part 3 Execution

3.1 Examination

3.1.1 Verify that adjacent materials and surfaces are dry, in a dust free environment, free of obstructions, and ready to receive Acoustic Board installation.

3.2 Preparation

3.2.1 Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory or unsafe conditions have been corrected.

3.2.2 Confirm to the manufacturer that the site has been properly prepared prior to installation.

3.3 Installation

3.3.1 Install Acoustic Board to metal deck using impaling pins and construction adhesives.

3.3.2 When installing with adhesive, follow adhesive manufacturer’s recommendations for surface preparation and pattern prior to installation.

3.3.3 When installing with impaling pins, follow pin manufacturer's recommendations for surface preparation, location and spacing of pins. Pin length shall be selected to ensure tight fit. Where subject to contact, protect pin tips.

3.3.4 Paint exposed pin washers flat black.

END OF SECTION

SECTION 102113 STAINLESS STEEL TOILET PARTITIONS

PART 1-GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless steel toilet compartment partitions[floor mounted, overhead braced] for following applications:

a. Toilet enclosures.
b. Urinal screens.

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM A 743/A 743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
4. ASTM B 86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.
5. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM B 221/B 221M - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.

B. International Code Council (ICC)/American National Standards Institute (ANSI):

1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

C. United States Department of Justice:

1. ADA - Americans with Disabilities Act, Excerpt from 28 CFR Part 36 - ADA Standards for Accessible Design.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for each type of product indicated. Include fabrication details, description of materials and finishes.

1. Product Test Reports: When requested by Architect, submit documentation by qualified independent testing agency indicating compliance of products with requirements.

B. Shop Drawings: Include overall product dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance and cleaning instructions.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum **[**5**]** years experience in the manufacture of toilet compartments.

B. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum 3 years.

C. Source Limitations: Obtain toilet compartment components and accessories from single manufacturer.

D. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 0.
2. Smoke-Developed Index: 0.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are in operation.

1. Deliver toilet compartments in manufacturer's original packaging.
2. Store in an upright condition.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:

1. Stainless Toilet Partitions: Against rust-out: 15 years.

2. Stainless Steel Hardware: Lifetime.

PRODUCTS

1.9 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of The Mills Company, Marion, OH 43302.

1. Contact Information: (800)272-3539, fax (262)251-5817; Email info@BradleyCorp.com; Website www.bradleycorp.com.

2. Ampco by AJW.

3. Accurate Partition Corp.

4. Metpar Corp.

5. Rockville Partitions.

1.10 MATERIALS

A. Stainless Steel Sheet: A 666, 300 series commercial stainless steel sheet suitable for exposed applications. Provide smooth material, without creases or ripples.

1. Provide with No. #4 finish.

B. Stainless Steel Castings: ASTM A 743/A 743M.

C. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

D. Aluminum: ASTM B 221/B 221M.

1.11 STAINLESS STEEL TOILET COMPARTMENTS

A. Toilet Compartment Type:

1. Overhead braced.

a. Basis of Design Product: Bradley, Mills Partitions, Sentinel, Series 400.

B. Urinal Screen Style:

1. Wall hung with wing bracket:

a. Basis of Design Product: Bradley, Mills Partitions, Model No. 2.
b. Provide chrome plated continuous angle for mounting to wall.

2. Government-flanged with Wing Bracket:

a. Basis of Design Product: Bradley, Mills Partitions, Model No. 5.
b. Provide with continuous bracket in addition to wing bracket.

C. Door, Panel, and Pilaster Construction, General: Form edges with interlock to provide watertight fit without crown molding. Braze corners and finish smooth.

1. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, telegraphing of core material, or other imperfections.
2. Core Material: Manufacturer's standard sound-deadening, water resistant honeycomb in thickness required to provide finished thickness for doors, panels and pilasters.

D. Door Construction: 1 inch (25 mm) thick, constructed from 0.0313 inch/22 ga (0.794 mm) stainless steel.

1. Provide each door with internal 0.0625 inch/16 ga (1.59 mm) and 0.0781 inch/14 ga (1.98 mm) welded reinforcements at top and bottom hinge locations, with factory installed concealed true gravity cam hinges.
2. Provide pre-punched hole to permit field installation of ADA-compliant concealed slide latch.

E. Panel Construction: 1 inch (25 mm) thick, constructed from 0.0313 inch/22 ga (0.794 mm) stainless steel.

1. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.

F. Pilaster Construction: 1 1/4 inch (32 mm) thick, constructed from 0.0375 inch/20 gauge (0.953 mm) stainless steel.

1. Provide pilaster with internally welded bracket suitable to accept minimum 3 inch (76 mm) long, 5/16 inch (7.9 mm) stainless steel hex bolt for leveling.

G. Headrail: Extruded anodized aluminum headrail with anti-grip profile. Provide fasteners for attachment to pilaster and stainless steel brackets to secure to wall.

H. Urinal-Screen Construction: Matching toilet compartment panel construction

1.12 HARDWARE

A. Hardware, Heavy Duty: Manufacturer's heavy-duty stainless steel castings, including stainless steel tamper-resistant fasteners:

1. Hinges: Self-closing wrap-around gravity-type, adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door. Mount with stainless steel through-bolts.
2. Latch and Keeper: Concealed slide latch wrap-around rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.
4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

1.13 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Door Size and Swings: Unless otherwise indicated, provide 26-inch- (660-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

EXECUTION

1.14 EXAMINATION

A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.

1. Proceed with installation once conditions meet manufacturer's requirements.

1.15 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.

C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2 inch (13 mm) between pilasters and panels, and 1 inch (25 mm) between panels and walls.

1.16 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors **[** and doors in privacy screens**]** to return doors to fully closed position.

1.17 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 101400 – SIGNAGE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Standard Braille Interior Wall Mounted Panel Signs.
B. Cast Aluminum Plaque.
C. Attached ADA 2010 CHAPTER 7: COMMUNICATION ELEMENTS AND FINISHES.

1.2 SUBMITTALS

A. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

B. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

1. Provide message list for each sign required, including large-scale details of wording and layout of lettering.
2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions of installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
3. Furnish full-size rubbings for metal plaques.

C. Samples: Provide the following samples of each sign component for initial selection of color, and pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for verification of color, pattern, and texture selected, and compliance with requirements indicated:

a. Cast Acrylic Sheet and Plastic Laminate: Provide a sample panel not less than 8 ½ inches by 11 inches for each material indicated. Include a panel for each color, texture and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is below 70 degrees F degrees C). Maintain this minimum during and after installation of signs.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Engraved Signs: Laminated colored plastic; total thickness of 0.0625 inch; 6" x 6"; beveled edges; lettering engraved through face material to expose core color.

Characters formed to Helvetica style. Signage must comply with ADA. All room signs other than Mechanical, Electrical, Stair, Restroom and Janitor shall have slot for name plate or information.

B. Face Color: Selected from standard colors.

C. Core Color: Black.

D. Character Proportion: Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a store width-to-height ratio between 1:5 and 1:10.

E. Character Height: Character height of at least 5/8" and no higher than 2" using uppercase sans series or simple series type letters accompanied with Grade II Braille - Letters, numerals and Braille shall be raised 1/32".

F. Restroom signs design ADA-3, size 8" x 8" with a 4" accessibility and gender symbol with the verbal description placed directly below and followed by Grade 2 Braille.

G. Signs should be mounted using vinyl tape and Silastic adhesive. All signs shall be mounted 60" from the floor to the center of the sign on the latch side. The distance between the door frame and sign should be 2". Installer user assumes responsibility for suitable installation of the signs.

H. Cast Aluminum Plaque: Provide one 24” x 36” Cast Aluminum Plaque.
1. Equal to A.R.K. Ramos with the following specification:
a. Border: #513
b. Mounting: No. 1
c. Finish: AL-200
d. Texture: Matte
e. Lettering: Helvetica Medium

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer’s instructions.

1. Install sign levels, plump, and at the height indicated, with sign surfaces free from distortion and other defects in appearance.

B. Wall Mounted Braille Panel Signs:
1. Attach panel signs to wall surfaces using the methods indicated below:
Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

3.2 CLEANING AND INSPECTION

At completion if the installation, clean soiled sign surfaces in accordance with the manufacturer’s instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 102800 – TOILET and BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Public-use washroom accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) minimum nominal thickness.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 PUBLIC AND PRIVATE-USE WASHROOM ACCESSORIES

A. Approved manufacturers for all products:

1. Bradley Corporation.

2. Bobrick Washroom Equipment.

3. ASI – American Specialties Inc.

SCHEDULE OF ACCESSORIES:

1. Framed Plate Glass Mirror- Bobrick B-165 2430

2. 36" Grab Bar: Bobrick No. B-6806 x 36.

3. 42" Grab Bar: Bobrick No. B-6806 x 42.

4. 18" Grab Bar: Bobrick No. B-6806 x 18.

   Typical for each grab bar:
   Mounting: Flanges with concealed fasteners.
   Material: Stainless steel, 0.05 inch (1.3 mm) thick.
   Finish: Smooth, No. 4, satin finish.

   Outside Diameter: 1-1/2 inches (38 mm).
   Configuration and Length: As indicated on Drawings.

5. Robe Hook: Bobrick No. 211.
   Material and Finish: Polished Chrome Finish.

6. Electric Hand Dryer: Equal to Excel XLERATOR Model No. XL-SB.

7. Mop & Broom Holder (One at Janitor Closet): Bobrick No. B-223 x 24.
   Stainless Steel
   4 hooks

2.3 FABRICATION

General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lb, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 105300 ALUMINUM WALKWAY COVER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-engineered aluminum Walkway Cover System.

B. System includes columns, fascia/gutter, roof deck, flashings, etc., for a complete substructure.

1.2 REFERENCES

A. Aluminum design Manual 2000, Specifications & Guidelines for Aluminum Structures.

B. ACE 7, Minimum Design Loads for Buildings and Other Structures.

C. American Architectural Manufacturers Association (AAMA).

D. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product information, specifications and installation instructions for components and accessories.

B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and option installation details to clearly indicate proper assembly of components. Detailed shop drawings shall be submitted, sealed by a State Registered Structural Engineer.

C. Certification: Submit written Certification prepared and signed by a State Registered Structural Engineer verifying that framing design will safely resist wind uplift as computed by ANSI A58.1, IV=150, Exposure C, as well as meet indicated loading requirements of the Standard Building Code, latest edition as referenced in State Requirements for Educational Facilities 1999 and wind loading requirements of ANSI/ASCE 7-98, live and dead loads and other load requirements.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following except as otherwise indicated: Standard Billing Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum covered walkway system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualifications: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this

section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to ensure proper fitting of work.

E. Coordination: Coordinate work of this section with work of other sections which interface with covered walkway system (sidewalk, curbs, building fascias, etc.)

1.5 WARRANTY

A. Provide manufacturers standard one-year warranty that shall include, but not limited to, coverage for structural, water tightness and finish beginning the day of Substantial Completion of Installation.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Superior Metal Products Company, Inc.
116 Citation Court
Birmingham, Alabama 35209-6307
877-445-1200
205-945-5694 Fax
www.superiormetalproducts.com

B. Mason Corporation
123 West Oxmoor Road
Birmingham, Alabama 35209
800-763-4488

C. Tennessee Valley Metals, Inc.
2720 Southeastern Circle
Birmingham, Alabama 35215
205-853-1125
205-853-1314 Fax
800-551-2579

D. Peachtree Protective Covers
1477 Rosedale Drive
Hiram, Georgia 30141
770-439-2120
770-439-2122 Fax
800-341-3325
www.peachtreecovers.com

E. Mitchell Metals LLC
1761 McCoba Drive Suite A
Smyrna, Ga. 30080
770.741.2662

2.2 MATERIALS

A. Decking: Decking panels shall be 16" x 3" x .032" rolled formed W-Pan. Baked enamel finish.

B. Fascia/Gutter: Full perimeter extruded aluminum fascia/gutter 8" x 4 1/8" x .125” Baked on enamel finish.

C. Canopy (If applicable or indicated on drawings)
Columns: Extruded aluminum canopy columns 4" x 4" baked on enamel finish.

D. Canopy
Beams: Extruded aluminum C-beams as required.

E. Aluminum Extrusions: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.

F. Finishes: Factory Baked Enamel Finish, AAMA 603.8 All material to be Dark Bronze color.

2.3 COMPONENTS

A. Columns: Columns shall be radius-cornered tubular extrusion of size shown on drawings with cutout and internal diverter for drainage where indicated. Circular downspout opening in column is not acceptable.

B. Beams: Beams shall be open-top tubular extrusion of size and shape shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams.

C. Deck: Deck shall be extruded self-flashing sections interlocking into a composite unit.

D. Fascia: Fascia shall be manufacturer’s standard shape. Size as indicated on drawings.

E. Flashing: Flashing shall be .032 aluminum (min.). All thru-wall flashing is completed by others.

F. Arches: Arches for barrel vault protective covers shall be sharp-cornered tubular extrusions of size shown on drawings.

2.4 FABRICATION

A. Drainage: water shall drain internally from deck to beams to columns, for discharge out to rain diverters at or below ground level as indicated on architectural drawings.

B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 18" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to

offset dead load deflection.

2.5 LOCATION

A. See Site Plan.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that slab and wall are ready to receive the work.

B. Owner to install concrete sidewalks.

3.2 ERECTION

A. Drainage: Walkway canopies shall drain internally, from fascia/gutter to columns, and be discharged at or near finished grade level.

B. General: Canopies shall be installed according to approved plans and shop drawings and the entire structure shall be erected straight, true and plumb in accordance with standard construction procedures. All joins and connections will be tight and clean and all surfaces of work left in a clean condition.

C. Maintain plumb until permanently secured.

D. Minimize exposed fasteners. All joints to be tight and clean.

3.3 PROTECTION AND CLEANING

A. Touch up any damage paint using material supplied by the manufacturer.

END OF SECTION

SECTION 104400 – FIRE EXTINGUISHER CABINETS & FIRE EXTINGUISHERS

PART1 – GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets and fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed product and for each color and texture specified.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, provide the following:
Basis of Specification: Potter Roemer Model No. 1724 DV

2. Equal products from the following will be accepted.

(a) Fire End & Croker Corporation.
(b) J. L. Industries, Inc., a division of Activar Construction Products Group.
(c) Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
(d) Larsen's Manufacturing Company.
(e) Modern Metal Products, Division of Technico Inc.
(f) Moon-American.
(g) Potter Roemer LLC.
(h) Watrous Division, American Specialties, Inc.

B. Cabinet Material: Steel sheet.

C. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

1. Square-Edge Trim: 1-1/4 to 1-1/2 inch (32 to 38mm) backbend depth.
2. Rolled-Edge Trim: 2-1/2 inch 64mm backbend depth.

D. Door Material: Steel sheet.

E. Door Style: Vertical duo panel with frame.

F. Door Glazing: Tempered break glass.

G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

H. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

1.) Location: Applied to cabinet door.
2.) Application Process: Silk-screened.
3.) Lettering Color: Red.
4.) Orientation: Vertical.

I. Fire Extinguisher: Equal to Potter Roemer 10 lb Model No. 3010.

J. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

a. Exterior of cabinet door, and trim, except for those surfaces indicated to receive another finish.
b. Interior of cabinet and door.

2. Steel: Baked enamel or powder coat.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.

B. Install fire protection cabinets in locations and at mounting heights indicated, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 122200 – ACOUSTICAL CURTAINS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Acoustical Curtains, track and track mounted curtain machines.

B. All motorized acoustical curtains above the acoustical shelf on all four walls of the Rehearsal Room are to be and Alternate. The manually operated curtain on the north wall below the acoustical shelf is part of the Base Bid.

C. Work Included:

1. Provide all necessary labor and materials for the fabrication, furnishing, accessories, transportation, delivery, and installation, and incidental services required for the complete installation of a fully functional acoustical curtain and rigging system as described within drawings and specifications.

2. This specification covers the fabrication, and installation of curtains, and all incidental or related items necessary to complete the work as described herein, even though they may not be specifically enumerated. The Rigging Contractor shall provide a complete, fully functional system as described herein and shown on drawings.

3. The work of this section shall include, but not necessarily be limited to the following. The following list is for reference only and is not intended to define limits of the work for a complete installation. Carefully follow all written specifications and drawings and provide such work for a complete and operable system.

   a. The supply and installation of Acoustical Drapery per specifications and drawings.

   b. The supply and installation of curtain tracks and draw curtain machines per specifications and drawings.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Tracks: Include maximum weights of draperies that can be supported.

   a. Motorized Tracks: Indicate motor weights, motor-mounting requirements, and electrical requirements.

2. Fabrics.

3. Track mounted curtain machines.

B. Shop Drawings: For tracks. Show installation and anchorage details, locations of components and controls, and field measurements.

1. Draperies: Show sizes, locations, and details of installation.

C. Coordination Drawings: For track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items.

D. Samples: For each drapery and for each fabric color and texture required.

E. Product Schedule: Use same designations indicated on Drawings.

F. Product Certificates: For each fabric treated with flame retardant, signed by fabric supplier.

G. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: For draperies and tracks, fabricator of draperies.

B. Source Limitations: For draperies, obtain each color and pattern of fabric and trim from one dye lot.

C. Fire-Test-Response Characteristics: For fabrics treated with fire retardants, provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Mockups: Install mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Install mockup for each type of product and combination of products indicated.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

A. Motorized Track Mounted Curtain Machines:

1. Traction drive automatic curtain machine shall be capable of operating curtain between preset open and close positions at a cable speed of 78 feet per minute. Machine shall be secured to fabricated steel base designed to attach onto 1-1/2” pipe batten above curtain

track. Incorporate two 4" Nylatron ball bearing pulleys to align operating cable with curtain track.

2. Provide 6" diameter cast iron drive pulley with double V-groove machined to accept 3/16" diameter operating cable. Mount pulley to output shaft of gear reducer and secure with keyed steel hub. Install spring equipped, Nylatron ball bearing idler to maintain cable tension.

3. Gear reducer shall be single reduction worm gear type designed for continuous duty. Precision machined gearing shall operate in a synthetic oil bath within a factory-sealed cast aluminum housing requiring no maintenance. The gear reducer shall have a AGMA service factor of at least 1.0 for continuous operation.

4. Unit shall be driven by 1/3 HP*, 115V single phase capacitor motor directly coupled to the input shaft of the reducer. Motor shall be instantly reversing type to allow motor to reverse rotation without stopping. Install junction box on motor with terminal blocks for connecting motor leads and limit switches. Motors shall be located so as to be easily serviced by University personnel for maintenance. Coordinate location with architect.

5. Starter cabinet shall be a separate, wall-mounted enclosure containing all the necessary contractors, circuit breakers, overloads, transformer, and fuses to provide for reversing operation. Low voltage controls shall be automatic with electrical latch to hold run circuit until limit switch is reached or stop button is pushed. Provide mechanical and electrical interlocks between contactors to prevent accidental motor reversal. Mount three pushbuttons on cabinet for local open, close, and stop control. All field connections shall be made through terminal blocks in the starter cabinet.

6. Provide two track mounted limit switch assemblies to automatically preset desired travel of curtain between open and close positions. Limit switch circuits shall operate at 24 VAC.

7. Supply remote control station consisting of three pushbuttons mounted to stainless steel plate to fit standard single-gang switch box. Remote controls shall operate at 24 VAC.

8. Model No. 462-1/3* as manufactured by H & H Specialties Inc., or approved equal.

9. Four track mounted curtain machines required. One for each wall in rehearsal room.

10. Note that lower curtain on North Wall in Base Bid shall be manually operated.

B. Curtain Track:

1. Provide Model 401S as manufactured by H&H Specialties Inc., South El Monte, CA. or approved equal.

2. Track shall be 14 gauge galvanized steel, roll-formed to 2-5/8" wide X 2-3/4" high channel with continuous slot in bottom. Provide unspliced in lengths up to 26".

3. Suspend track with two-piece clamp hanger formed from 11 gauge steel. Provide 2" overlap at center, rigidly separated by two overlap clamps. Install end stop with cord support at

each track end. Where lengths exceed 26', connect tracks with 12" long, two-piece splicing clamp of 12 gauge steel.

4. Provide single carriers, spaced on 12" centers, constructed of two polyethylene wheels fastened parallel to carrier body. Supply with heavy-duty hook, swivel eye and 3" trim chain for attachment of curtain. Black Super Tough nylon shall be molded around shielded and greased ball bearing to form carrier body. Install round neoprene bumper between each carrier on operating line to reduce noise.

5. Master carriers shall be 4-wheel assemblies with bodies formed from 11 gauge steel with press-fit ball bearings. Connect to operating line with two formed steel cord clamps attached to each body. Supply each master carrier with two heavy-duty hooks, swivel eyes and 3" trims chains for attachment of leading edge of curtain.

6. Single and double end pulleys shall clamp securely to the underside of the track channel and shall contain 4" diameter sheaves enclosed in steel housings to prevent operating line from escaping the grooves. Sheaves shall be Nylatron GS molded around shielded and greased ball bearings and grooved to accommodate up to 3/8" operating line.

7. Provide floor block in 12 gauge steel housing containing 4" Nylatron GS shielded ball bearing sheave. Sheave axle shall lock at any point within 9" vertical slots to allow tension adjustment of operating line.

8. Black operating line shall be 3/8" diameter, stretch-resistant rope with spun polyester outer jacket braided over Dyneema core.

9. All steel components shall be zinc plated to resist corrosion.

2.1 DRAPERIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Creative Draperies Inc.
2. Standard Textile Co., Inc.
3. Wesco Fabrics, Inc.
4. K & M Fabrics.
5. JB Martin

C. Drapery: (See drawings for sizes)

D. General Drapery Construction

1. All fabric material shall be new and unused. Full and continuous lengths shall be used for the full height of each curtain face, with no piecing or cross-seams allowed. All drapery of the same color shall be constructed of fabric from the same dye lot.

2. Unless specified otherwise herein, sew fabrics with nylon filament thread. Employ matching thread throughout.

3. All Acoustical curtains shall be sewn with 100% fullness, unless specified otherwise on drawings or schedule. Pleats shall be box style and utilize a minimum of 6" of additional fabric for 50%, 9" of fabric for 75% or 12" of fabric for 100% fullness when fully deployed. All pleats shall be consistent throughout the various curtains (with same specified fullness) and all curtains with less material than specified will be rejected.

4. Scrims, Muslin Cycloramas, and Chroma-Key fabrics will be sewn flat, with 0% added fullness.

5. Fabric fullness shall be considered the calculation of total unfinished fabric piece width divided by the finished width of the piece. No less than a half-strip of fabric shall be included into the piece.

6. The velour pile nap for velour curtains shall be sewn in the "down" direction.

7. Bi-parting Traveler curtains shall be constructed in two matching halves, sized to allow minimum 24" overlap at the centerline of curtains.

8. Field dimensions shall be the contractor's responsibility to obtain, to guarantee that proper sight lines are taken into consideration. Audience sight lines must never permit visual "holes", in which case drapery dimensions shall be increased as needed to insure proper aesthetic masking of offstage and overhead areas.

9. Seams between strips shall be single stitched without puckers using thread of matching color. All fabrics with a grain or pile shall have all strips running in the same direction.

10. A label shall be attached 6 feet from the bottom of every curtain displaying curtain height, width, fabric name, inherent flame retardance, and date of fabrication.

11. Provide acoustical interlining manufacturer as selected by fabricator for use with drapery and liner fabrics.

D. Front Setting Fabric

1. Velour shall be 100% Polyester, 25-26 ounce Velour. Fabric shall be Inherently Flame Retardant. Submit certificates showing dye lot and flame test. Architect to select color.

E. Construction

1. Traveller Curtains: Top hem shall be turned and reinforced with continuous 3" heavy polypropylene webbing weighing a minimum 2.8 ounces per yard, and double-stitched at the top. Webbing shall be double stitched to the top of the curtain with ½" of face fabric

turned under the webbing. Fullness shall be sewn in with box pleats approximately 12" on center. A #3 brass anodized black grommet shall be inserted on every pleat and at ends with minimum ½" fabric remaining above top edge of grommet. Bit snaps or ADC model CC-2 snaps shall be provided for attachment to carriers at each pleat and ends of curtain. Bottom hem shall be 5" and contain a continuous No. 8 jack chain held in a muslin pocket sewn securely to be held 1" above the bottom of the hem. Jack chain shall be secured to muslin pocket every 9". Side hems shall be a minimum of 9" on the leading edge and 3" on the offstage edge. Vertical seams with selvages shall be snipped every 36" for proper hanging.

PART 3 - EXECUTION

3.1 DRAPERY TRACK INSTALLATION

A. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjoining openings as indicated on Drawings.

B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

3.2 DRAPERY INSTALLATION

A. Where draperies abut overhead construction, hang draperies so that clearance between headings and overhead construction is 1/4 inch (6.4 mm).

B. Where draperies extend to floor, install so that bottom hems clear finished floor by not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm).

3.3 ADJUSTING

A. After hanging draperies, test and adjust each track to produce unencumbered, smooth operation.

B. Steam and dress down draperies as required to produce crease- and wrinkle-free installation.

C. Remove and replace draperies that are stained or soiled.

END OF SECTION 122200

Goodwin Hall-Renovation and
Band Rehearsal Hall Addition
AU Project No. 15-255

SECTION 124941 ROLLER SHADES

PART 1 GENERAL
1.1 SECTION INCLUDES

A. Motorized roller shades.

B. Local group and master control system per shade operation with remote control.

C. Local group and master control system per shade operation with addressable motors.

1.3 REFERENCES

A.ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.
5. Typical wiring diagrams including integration of motor controllers with audiovisual and lighting control systems as applicable.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

D. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.

E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 WARRANTY

A. Motorized Standard Shadecloth: Manufacturer's standard twenty-five year warranty.

B. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five year warranty.

C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. MechoShade Systems, Inc. is the basis of design.

Approved manufacturers:

1. BTX

2. Silent Gliss

2.2 ROLLER SHADE TYPES

A. Motorized Shades: Rehearsal Hall.
   1. Mounting: Surface mounted with fascia.
   2. Configuration: Single Solar shadecloth.
   3. Solar Shadecloths:
      a. Fabric: Thermoveil 0900, 0-1 percent open, tightly woven translucence.
      b. Color: Selected from manufacturer's standard colors

B. See Architectural drawings for full extent and locations of all shades.

2.3 SHADE CLOTH

A. Visually Transparent Shadecloth: MechoShade Systems, Inc., ThermoVeil series, single thickness non-raveling 0.030-inch (0.762 mm) thick vinyl fabric, woven from 0.018-inch (0.457 mm) diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl.

2.4 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
   2. Shade Band and Shade Roller Attachment:
      a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
      b. Provide for positive mechanical engagement with drive / brake mechanism.
      c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
      d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
      e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.6 COMPONENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Motorized Shade Hardware and Shade Brackets:
   1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
   2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
   3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).

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2.7 SHADE MOTOR DRIVE SYSTEM

A. Shade Motors:
   1. Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor operating at 110v AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
   2. Conceal motors inside shade roller tube.
   3. Maximum current draw for each shade motor of 2.3 amps.
   4. Use motors rated at the same nominal speed for all shades in the same room.

B. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.

2.8 ACCESSORIES

A. Fascia:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. The Architect will produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the Electrical Contractor, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. Electrical Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
2. General Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
3. Electrical Contractor shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
4. Electrical Contractor shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.

Electrical Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 21 01 00 - GENERAL FIRE PROTECTION REQUIREMENTS

1.1 GENERAL

A. Summary

1. The fire protection system will be fully coordinated with all disciplines.

B. Reference Standards

1. Work shall comply with latest codes and NFPA.

C. Existing Conditions

1. Work in existing areas will be coordinated with owner for outages.

D. Definitions

1.2 PRODUCTS

A. Manufacturer’s

1. All bids shall be based on material specified.

B. Basis of Design

C. Shop Drawings and Product data

1. Fire sprinkler shop drawings will be prepared under the supervision of an engineer licensed in the State of Alabama and these drawings will bear their signed and dated seal.

D. As-Built Drawings

1. The Contractor shall maintain on a daily basis at the Project site a complete set of “Record Drawings”.

1.3 EXECUTION

A. Installation

B. Structural Fittings

1. Furnish and install the necessary sleeves, inserts, hangers, anchor bolts, and related structural items.
2. Cutting and Patching

C. Weatherproof Equipment

D. Cleaning

E. Tests & Demonstrations

1. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

F. Warranties

1. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter. The warranty shall include parts and labor.

END OF SECTION

SECTION 21 05 29 - HANGERS & SUPPORTS FOR FIRE SUPPRESSION PIPING & EQUIPMENT

1.1 GENERAL

A. Related Documents

B. Description of Work

1. Provide pipe hangers, supports, and required appurtenances as specified and indicated

C. Quality Assurance

1. Acceptable Manufacturers: Afcon, Globe Pipe Hanger Products Inc, PHD Manufacturing Inc, Anvil International, Cooper B-Line

1.2 PRODUCTS

A. Pipe Hangers and Supports

1. Inserts: Provide Universal Concrete Insert No. 282 for concrete construction.
2. Piping in Multiple Parallel Runs: Provide Power-Strut or Uni-Strut U-bolt pipe clamps or structural channels or angles with U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown.
3. Piping 4” and larger pipes in Single Runs: Provide Fig No. 260 clevis hanger rings.
4. Piping 3” and smaller in Single Runs: Provide Fig No. 69 adjustable swivel hanger rings.

1.3 EXECUTION

A. Installation

1. Support fire sprinkler and standpipe piping independently of other piping in accordance with NFPA-approved methods and local codes and standards.
2. Spacing of hangers per code.
3. Anchors
4. Leveling
5. Vibration Isolation
6. Riser Supports

END OF SECTION

SECTION 21 11 00 – FIRE PROTECTION SYSTEMS

1.1 GENERAL

A. Summary

1. Furnish and install all components of the fire protection system

B. Description of Work

1. Provide a complete fire protection standpipe system and sprinkler system, including pipe, tube fittings, fire and jockey pumps, and appurtenances as indicated, in compliance with these Specifications and as required by local code agencies.

2. Related work

3. Applications

a. Supply mains, valves, risers, and drains.

b. Standard pattern Siamese connections per local Fire Department Regulations.

c. Fire hose stairway valves.

d. Flow switches.

e. Fire pump, controllers, and accessories.

f. Jockey fire pump, controllers, and accessories.

g. Dry-pipe air compressor and valves.

h. Hydraulically designed sprinkler system.

C. Quality Assurance

1. Materials shall be installed in accordance with NFPA 13 and NFPA 14

2. Coordination Drawings

3. Acceptable Manufacturers

a. Sprinkler Equipment: Viking Corporation, Tyco Fire Protection Products, Victaulic Corporation, Reliable Automatic Sprinkler Company

b. Fire Hose Equipment: Potter Roemer, Inc., Elkhart Brass Company, Badger Powhatten, Croker

4. Pipe and Hanger Supports

D. Combination Standpipe System

1. Install a dry pipe sprinkler system for sprinkler piping installed outside of the building insulation envelope and in unheated to provide complete coverage.

2. Install combination standpipe system in the building consisting of risers extended up from the lowest level with 2 1/2" hose valves on each floor in stairwells and a wet pipe sprinkler system to provide complete coverage on each floor.

3. Install a sprinkler system in all elevator shafts and spaces housing elevator machinery or controls.

4. System piping shall be hydraulically designed throughout areas in accordance with the rules and regulations of NFPA 13, using design densities of:

   a. Light hazard areas: 0.10 gpm per 1,500 square feet with maximum Sprinkler head spacing of 225 square feet per sprinkler head.

   b. All ordinary hazard areas: 0.20 gpm per 1,500 square feet with maximum sprinkler head spacing of 130 square feet.

5. Sprinkler heads, valves, alarms, and similar items shall be as manufactured by Viking, Grinnell, or other approved manufacturer.

E. Valves

1. Valves shall be UL listed and FM approved for the pressures at which they are installed.

2. Supervised valves shall include valve tamper switches.

1.2 PRODUCTS

A. Piping

1. Standpipe and sprinkler piping shall be ASTM A135, Schedule 40 black steel.
2. Dry system piping shall be galvanized steel.

B. Equipment

1. Fire Hose Valves
2. Fire Department Connection
3. Roof Manifold
4. Water Flow Switch
5. Sight Flow Connection.
6. Sprinkler Heads
7. Dry Pipe Valve
8. Accelerator
9. Alarm Bell

1.3 EXECUTION

A. Installation of piping Systems

B. Protection during Construction

C. Inspections and Tests

D. Underground Piping

END OF SECTION

SECTION 22 01 00 – GENERAL PLUMBING REQUIREMENTS

1.1 GENERAL

A. Summary

1. The plumbing system will be fully coordinated with all disciplines.

B. Reference Standards

1. Work shall comply with latest codes.

C. Existing Conditions

1. Work in existing areas will be field coordinated.

D. Definitions

1.2 PRODUCTS

A. Manufacturer’s

1. All bids shall be based on material specified.

B. Basis of Design

C. Shop Drawings and Product data

1. Shop drawings will be provided by the contractor prior to any work on site.

D. As-Built Drawings

1. The Contractor shall maintain on a daily basis at the Project site a complete set of “Record Drawings”.

1.3 EXECUTION

A. Installation

B. Structural Fittings

1. Furnish and install the necessary sleeves, inserts, hangers, anchor bolts, and related structural items.
2. Cutting and Patching

C. Weatherproof Equipment

D. Cleaning

E. Tests & Demonstrations

1. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

F. Warranties

1. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter. The warranty shall include parts and labor.

END OF SECTION

SECTION 22 05 29 - HANGERS & SUPPORTS FOR PLUMBING PIPING & EQUIPMENT

1.1 GENERAL

A. Related Documents

B. Description of Work

1. Provide pipe hangers, supports, and required appurtenances as specified and indicated

C. Quality Assurance

1. Acceptable Manufacturers: ITT Grinnell Corporation, Fee and Mason, Central Iron Manufacturing Company, F& S Manufacturing Company, Anvil International & B-Line.

1.2 PRODUCTS

A. Pipe Hangers and Supports

1. Inserts: Provide Universal Concrete Insert No. 282 for concrete construction.
2. Piping in Multiple Parallel Runs: Provide Grinnell No. 45 or No. 50 with Grinnell No. 137 U-bolt pipe clamps or structural channels or angles with U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown.
3. Piping in Single Runs: Provide Fee and Mason Fig. 239 or Grinnell No. 260 clevis hanger.
4. Hanger Rods
5. Riser Clamps
6. Saddles & Shields
7. Piping on Roof

1.3 EXECUTION

A. Installation

1. Provisions for Movement
2. Insulated piping
3. Spacing of hangers per code.
4. Saddles
5. Guides
6. Anchors
7. Leveling
8. Vibration Isolation
9. Riser Supports

END OF SECTION

SECTION 22 05 53 – IDENTIFICATION FOR PLUMBING PIPING & EQUIPMENT

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the identification of equipment and piping for plumbing systems.

B. Description of Work

1. Identification of plumbing equipment shall consist of equipment labeling, pipe marking, and valve tagging.

    a. In general, all equipment shall be labeled.

    b. Pipe markings shall be applied to all piping.

    c. Each valve shall be identified with a stamped tag.

    d. Labels, tags, and markers shall comply with ANSI A13.1 and other applicable state and local standards for lettering size, colors, and length of color field.

C. Acceptable Manufacturers

1. Labels, markings, and tags shall be manufactured by W.H. Brady, Seton, Allen, or Industrial Safety Supply.

1.2 PRODUCTS

A. Equipment Labeling

1. Permanently Attached
2. Stencil Painted

B. Pipe Markings

1. On piping less than 6” diameter, install plastic semi-rigid snap-on type.
2. On piping and insulation 6” and greater diameter, full band as specified above or strip-type markers fastened to the pipe.
3. Provide arrows for direction of flow.

C. Valve Tags

1. Valve tags shall be polished brass or plastic laminate with solid brass S hook and chain.
2. Valve Schedule

1.3 EXECUTION

A. General

1. Provide after insulation is complete.
2. Coordination
3. Unit Designation
4. Placement of Markers
5. Placement of Valve Tags

END OF SECTION

SECTION 22 07 00 – PLUMBING INSULATION

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the insulation of plumbing piping and equipment.

B. Quality Assurance

1. Approved manufacturers are Armstrong, Calsite, Cell-U-Foarm Corp, Ceelco, Certainteed Corp, Dow Chemical Company, Forrest Mfg Co, Foster / Chilers, Gemco, Johns Manville, Knauf Fiberglass, Midwest Fastners, Owens Corning Fiberglass, Pittsburg Corning Fiberglass, Rubatex, Trymer, and Venture Tape.

C. Submittals

1. Product Data

a. Type A Insulation

b. Type B Insulation

c. Type C Insulation

d. Type D Insulation

e. Type E Insulation

f. Type F Insulation

g. Type G Insulation

h. Vinyl Lacquer Paint for Type B Insulation

i. Metal Jacket

D. Definitions

1.2 PRODUCTS

A. Piping Insulation

1. Type A – Fiberglass (indoor)
2. Type B – Closed Cell (indoor)
3. Type C – Polyioscyanurate (outdoor)
4. Type Da – Cellular glass

B. Equipment Insulation

1. Type Dh – Fiberglass Board (Hot Equipment)

C. Metal Jacket

D. Insulation Accessories

1.3 EXECUTION

A. Insulation Applicability

1. Condensate Drains (except in plenums and fire partitions/floors) – Type B insulation, ½ inch thick for all pipe sizes.
2. Condensate Drains (inside plenums and fire partitions/floors) – Type A insulation ½ inch thick for pipes up to 1 inch, and ¾ inch thick for all pipes larger than 1 inch.
3. Horizontal storm leaders, roof drain bodies, and underside of drains receiving condensate from cooling coils – Type F insulation 2 inches thick for all pipe sizes.
4. Horizontal waste piping from electrical water coolers – Type A insulation ½ inch thick for all pipe sizes.
5. Domestic Cold Water – Type A insulation 1 inch thick for all pipe sizes.
6. Domestic Hot Water and Tempered water – Type A insulation 1 inch thick for all pipe sizes.
7. Hot equipment – Type Dh insulation, minimum of 2 inches thick.

B. Piping Insulation General Requirements

1. Preparation
2. Application
3. Application at Fittings

C. Type A Installation

1. Cold Piping
2. Hot Piping
3. Exterior Piping

D. Type B Installation

E. Type C Installation

1. Exterior

F. Type D and E Installation

1. Equipment Insulation Application
2. Hot Equipment
3. Roof Drain Bodies

G. Metal Jacket Installation

H. Hangers

I. Pipe Sleeves

END OF SECTION

SECTION 22 10 00 – PLUMBING PIPING

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the plumbing piping systems.

B. Description of Work

C. Quality Assurance

1. Qualify welding procedures, welders, and operators in accordance with ANSI B31.1, Paragraph 127.5, for shop and job site welding of piping work.

1.2 PRODUCTS

A. Piping Materials

B. Pipe/Tube Fittings

1.3 EXECUTION

A. Piping Installation

1. General
2. Steel Pipe
3. Copper Pipe
4. Excavation, Installation, and Backfill for Underground Pipe
5. Anchors
6. Backfill
7. Existing Surfaces
8. Safety

B. Plumbing Services

C. Make-Up Water Piping Systems

D. Domestic Hot and Cold Water Piping Systems

1. Interior Hot and Cold Water Piping

a. Piping 3” and smaller, Type L copper tubing with wrought copper solder end fittings.

b. Piping 4” and larger, Schedule 40, galvanized steel pipe, ASTM A120 with galvanized malleable iron fittings, or galvanized cast iron flanged fittings.

2. Air Chambers

E. Underground Domestic Water Service & Fire Protection Piping

1. Piping 2 ½" and smaller, Type K, copper tubing with wrought copper brazed end fittings.
2. Piping 3" and larger, ductile iron bell and spigot, push-on joint, pressure water pipe.

F. Storm and Sanitary Drainage Piping Systems

1. Soil, Waste, and Vent piping underground.
   Service weight cast iron soil pipe and fittings with lead and oakum joints or neoprene gasket joints made up with "Lubrifast" joining material.

2. Storm Drainage piping underground.

   a. Same as soil, waste, and vent piping underground.

3. Soil, Waste, and Vent Piping above ground.

   a. Service weight cast iron soil pipe and fittings with neoprene gasket joints or hub-less cast iron pipe and fittings with coupling assembly.

4. Storm Piping above ground.

   a. Service weight cast iron soil pipe and fittings with neoprene gasketed joints or Schedule 40, service weight hub-less cast iron soil pipe and fittings with coupling assembly.

5. Pump Discharge Piping

   a. Schedule 40 galvanized steel cast iron drainage fittings.

6. Cleanouts

   a. Finished Floor: Jay R. Smith No. 4434, cast iron adjustable assembly with nickel bronze cover and tapered thread bronze plug

   b. Unfinished Areas: Jay R. Smith No. 4434 cleanout with cadmium-plated, cast iron plug.

   c. Walls: Jay R. Smith No. 4434, cast iron with nickel bronze, square, smooth, access cover, vandal-proof screws.

   d. Outside: Jay R. Smith No. 4434, non-slip, vandal-proof cover.

G. Natural Gas Piping System

1. Gas Piping intended for pressures of 5 psig or greater: ASTM A53, Schedule 40, black steel joined by Schedule 40, black welding fittings
2. Gas Piping intended for pressures less than 5 psig: ASTM A53, Schedule 40, black steel joined by Schedule 40, black welded fittings or Class 150 pounds, banded, black malleable iron, threaded fittings.

H. Cleaning, Flushing, Testing, and Inspecting

END OF SECTION

SECTION 22 11 13 - FACILITY WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Auburn University Design and Construction Guidelines (latest edition)

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

A. DIP: Ductile Iron Pipe

B. EPDM: Ethylene propylene diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. PA: Polyamide (nylon) plastic.

E. PP: Polypropylene plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
   1. Wiring Diagrams: Power, signal, and control wiring for alarms.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with requirements of Auburn University supplying water. Include tapping of water mains and backflow prevention.
   2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
   3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

F. NSF Compliance:
   1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flange faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
   1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
   2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution 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 water-distribution service according to requirements indicated:
   1. Notify Construction Manager no fewer than fourteen days in advance of proposed interruption of service.
   2. Do not proceed with interruption of water-distribution service without Construction Manager's written permission.

1.10 COORDINATION

A. Coordinate connection to water main with Auburn University, Facilities Division.

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: 1" or smaller ASTM B 88, Type K, water tube, annealed temper.

B. Hard Copper Tube: ASTM B 88, Type K, water tube, drawn temper.

C. Couplings for copper pipe shall be crimping type rings Rigid Pro Press system or approved equal.

D. Solid brass conductive union couplings Mueller 110 series or silver brazed or approved equal.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile Iron Pipe and fittings shall be cement mortar lined per ANSI/AWWA A21/4/C104. Ductile iron pipe shall also be furnished with outside asphaltic coating of 1 mil thickness per ANSI/AWWA A21.51/C151.

B. All ductile iron pipe and fittings shall have a minimum pressure class rating of 350.

C. Joints for ductile iron pipe to be installed underground shall be "Push-on" joint pipe per ANSI/AWWA A21.11-06/C11.

D. Gaskets for "Push-on" joint pipe shall be Styrene Butadiene Rubber locking type with high strength stainless steel wedges equally spaced around the gasket for full restraint per ANSI/AWWA A21.11-06/C111. Gaskets shall be:
   1. US Pipe and Foundry "Field Lok 350."
   2. American Cast Iron Pipe Company "Fast Grip."
   3. Additional Manufacturers may be submitted University Project Lead for review.

E. All below grade ductile iron fittings and valves shall be restrained by use of bolted restraint

F. Device shall be mega-lugs by EBBA Iron or approved equal.

G. All mechanical joint fittings requiring thrust blocks shall be wrapped in plastic prior to installation of concrete.

2.3 JOINING MATERIALS

A. Refer to Section 330500 "Common Work Results for Utilities" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

2.4 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Split-Sleeve Pipe Couplings:
   1. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
      a. Standard: AWWA C219.
      b. Sleeve Material: Stainless steel.
      c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.

d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
e. Pressure Rating: 200 psig minimum.
f. Metal Component Finish: Corrosion-resistant coating or material.

2.5 GATE VALVES

A. All gate valves shall have a minimum pressure class rating of 250 with iron-body, bronze mounted, inside-screw, resilient seat, non-rising stem and equipped with rubber O-ring seals at the top of the stems.

B. Gate valve bodies shall have mechanical joints for use below grade or flanged joints for above grade applications. 2" gate valves installed in vaults shall be standard threaded NPT connections.

C. Mechanical joint gate valves shall be manufactured per AWWA C515 and provided by Mueller Company (Model Number), M & H Industries (Model Number), or approved equal.

D. Flanged joint gate valves shall be manufactured per AWWA C515 and provided by Mueller Company (Model Number), M & H Industries (Model Number), or approved equal.

E. Valves 2" and larger installed below grade shall have a 2" square valve operating nut and turn left or counter-clockwise to open.

2.6 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:
1. Description: Sleeve and valve compatible with drilling machine.
a. Standard: MSS SP-60.
b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Valve boxed shall be two piece adjustable screw type asphalt coated with an inside diameter of 5 ¼ ". Sigma Corporation model VB261-8 or approved equal

C. Valve box lid shall be cast iron drop in non-locking type imprinted with "Water" on the top. Sigma Corporation model VB2600W or approved equal.

D. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve. Provide electronic monitoring for all post indicator valves.

2.7 CHECK VALVES

A. AWWA Check Valves:
1. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
a. Standard: AWWA C508.
b. Pressure Rating: 175 psig.

2.8 DETECTOR CHECK VALVES

A. Detector Check Valves:
   1. Per Auburn University requirements.
   2. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
      a. Standards: UL 312 and FMG approved.
      b. Pressure Rating: 175 psig.
      c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

2.9 CORPORATION VALVES AND CURB VALVES

A. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
   1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
   2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.

2.10 WATER METERS

A. Owner provided water meter located in concrete vault.

2.11 BACKFLOW PREVENTERS

A. Fire: Watts 709DCDA or similar and equal installed in a concrete vault with tamper switches and associated appurtenances.

B. Domestic: Watts LF007 or similar and equal installed in concrete vault with bypass.

2.12 CONCRETE VAULTS

A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
   1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
   2. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
      a. Dimension: 24-inch minimum diameter, unless otherwise indicated.
   3. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.
   4. Lid: Provide slam lock or similar aluminum access lid.

2.13 FIRE HYDRANTS

A. Hydrants shall be 3 nozzle type in compliance with AWWA C502. Mueller Super-Centurian, Model 250 or approved equal.

B. All fire hydrants assemblies shall include isolation valves.
   1. Outlet Threads: NFPA 1963, with external hose thread used by Auburn fire department. Include cast-iron caps with steel chains.

2.14 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:
   1. Per Auburn Fire Department requirements.

2.15 ALARM DEVICES

A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.

B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with 2 single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 EXECUTION

3.1 EARTHWORK

A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG,

nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Section 330500 "Common Work Results for Utilities" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Tap or cut in tees in water main according to requirements of Auburn University and of size and in location indicated.

B. Taps only allowed where branch line is 2 or more sizes smaller than main line. Equal size or one size smaller must be accomplished via cut in tee. (example 4" branch line connection to 8" line may be tapped. 6" branch line connection to 8" main line must be accomplished via cut in tee.

C. Make connections larger than NPS 2 with tapping machine according to the following:
   1. Install tapping sleeve and tapping valve according to MSS SP-60.
   2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
   3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
   4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

D. Make connections NPS 2 and smaller with drilling machine according to the following:
   1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
   2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
   3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
   4. Install corporation valves into service-saddle assemblies.
   5. Install manifold for multiple taps in water main.
   6. Install curb valve in water-service piping with head pointing up and with service box.

E. Comply with NFPA 24 for fire-service-main piping materials and installation.

F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
   1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

G. Bury piping with depth of cover over top at least 30 inches, with top below level of maximum frost penetration, and according to the following:
   1. Under Driveways: With at least 36 inches cover over top.
   2. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

H. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

I. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.6 JOINT CONSTRUCTION

A. See Section 330500 "Common Work Results for Utilities" for basic piping joint construction.

B. Make pipe joints according to the following:
   1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
   2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
   3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
   1. Concrete thrust blocks.
   2. Locking mechanical joints.
   3. Set-screw mechanical retainer glands.
   4. Bolted flanged joints.
   5. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
   1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.9 DETECTOR-CHECK VALVE INSTALLATION

A. Install in vault.

B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

C. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.10 CONCRETE VAULT INSTALLATION

A. Install precast concrete vaults according to ASTM C 891.

3.11 FIRE HYDRANT INSTALLATION

A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.

C. AWWA Fire Hydrants: Comply with AWWA M17.

D. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.12 FIRE DEPARTMENT CONNECTION INSTALLATION

A. Install ball drip valves at each check valve for fire department connection to mains.

B. Install protective pipe bollards on two sides of each fire department connection.

3.13 ALARM DEVICE INSTALLATION

A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.

B. Supervisory Switches: Supervise valves in open position.
   1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
   2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

C. Locking and Sealing: Secure unsupervised valves as follows:
   1. Valves: Install chain and padlock on open OS&Y gate valve.
   2. Post Indicators: Install padlock on wrench on indicator post.

D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.

E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.

F. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Section 283111 "Digital, Addressable Fire-Alarm System" and Section 283112 "Zoned (DC Loop) Fire-Alarm System."

3.14 CONNECTIONS

A. See Section 330500 "Common Work Results for Utilities" for piping connections to valves and equipment.

B. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

C. Connect water-distribution piping to interior domestic water and fire-suppression piping.

D. Connect waste piping from concrete vault drains to storm-drainage system. See Section 334100 "Storm Utility Drainage Piping" for connection to storm-sewer piping.

E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.15 FIELD QUALITY CONTROL

A. Hydrostatic Test. All pipelines shall be quality control tested in accordance with procedures and practices applicable to the various types and kinds of pipe and to the various sizes of pipe. The Contractor is reminded that personnel not experienced in testing procedures and practices should neither be allowed to conduct the test nor assist in the test procedures.The Contractor is solely responsible for safety during testing.

B. The hydrostatic test is to be performed at a pressure of 1.5 times the working pressure of the system at the point of the test, but not less than 150 psi.

C. Test pressures shall not exceed pipe or restraint device design pressures.

D. Test pressures shall not exceed the rated pressure of the boundary valves.

E. Water mains shall be sufficiently backfilled and restrained to prevent movement under pressure. Likewise, fitting restraints should be permanently installed with sufficient cure time for concrete thrust blocking prior to the test.

F. The line shall be flushed at a minimum flow of 3 feet per second to remove debris and air from the line. If air cannot be removed via flushing, then taps will be made at the points of highest elevation. All taps made shall be converted to manual air release valves through the use of lockable curb stops installed in an approved meter box.

G. The Contractor shall furnish all meters, gauges, pressure recorders, test plugs, valves, couplings, pitot gauges, test piping and fittings, pumps, compressors, receivers, motors, engines, electric power, fuel, water, supplies, labor tools, materials, equipment and supervision necessary to perform the tests required and shall make all connections necessary to perform the tests required.

H. Should any pipe line, or any section of the line, fail to meet the criteria established herein below, any deficiencies shall be corrected and the testing repeated until the specified test results have been achieved.

I. All water supply mains and other water lines underground shall be tested in accordance with the requirements of ANSI/AWWA C600 (for ductile iron pipe) or C605 (for PVC pipe) and in accordance with the requirements of these Specifications

J. Test pressure shall not be applied to instruments, controls, regulators or equipment.

K. Sections of mains placed under test shall be 1200 feet or less in length unless the concurrence of the Architect/Engineer is first secured.

L. Sections of mains to be placed under test shall be isolated by means of valves or test plugs.

M. The duration of the test shall be 24 hours, and the test pressure shall be 150 psi or 1½ times the normal working pressure, whichever is greater.

N. Pressure shall be recorded on a 24 hour pressure recorder satisfactory to the Engineer and test charts shall be provided to the Engineer and to the University Utilities Services Supervisor prior to acceptance of testing.

O. No pipe line, or section of pipe line, will be accepted if the leakage is greater than that as determined by application of the following formula:

$$L = SD \times \left(\frac{\sqrt{P}}{133{,}200}\right)$$

where,

L = Allowable leakage in gallons per hour

D = Nominal diameter of pipe in inches

S = Length of pipe being tested in feet

P = Average test pressure in PSIG

P. During testing the pressure in the main or line being tested shall be maintained as closely as possible to the test pressure specified.

Q. The pressure shall not be allowed to fall more than 5 psi below the specified test pressure.

R. Should the pressure drop more than 5 psi below the specified test pressure the test shall be restarted.

S. The water added to the main or pipe line in order to maintain the desired test pressure shall be metered through a bench-tested meter registering in gallons and fractions of a gallon.

T. The quantity of water added to the main or line during the test period shall be the leakage.

U. All visible leaks shall be repaired even when tested leakage rates are less than the limits as determined by application of the formula given hereinabove.

V. Contractor shall prepare reports of testing activities and submit them to the Designer and the Facilities Management Utilities Department.

3.16 IDENTIFICATION

A. All new water mains shall include underground warning tape placed 1’ above pipe during pipe backfill operations. Warning tape shall be non-conductive Poly 3” wide with 1” lettering 4 mils thick. Warning tape shall conform to APWA uniform color codes and shall read “BURIED WATER LINE".

3.17 CLEANING

A. Disinfection and Bacteriological Testing for Water Mains and Hydrants:

B. The Contractor shall disinfect the pipe, pipe fittings, valves, and hydrants installed in the system.

C. In general, all disinfection shall be in accordance with AWWA C651, latest revision. At a minimum contractor shall disinfect line in a manner that will result in a chlorine concentration of 50 parts per million (ppm) throughout the newly installed line. The concentration shall

remain in the line for a minimum of 24 hours to ensure all bacteria have been eliminated. The residual chlorine concentration, following the 24 hour disinfection period, shall be no less than 25 ppm.

D. The University Water Treatment Specialist shall witness dechlorination procedure and sampling activities.

E. Samples for bacteriological examination by the State Health Department shall be taken on consecutive days (two sets of samples taken 24 hours apart) by the Contractor and delivered to the State Health Department; and if the water quality does not meet the standards of the Health Department, the disinfection process shall be repeated until satisfactory water is obtained.

F. Samples for bacteriological examination shall be collected at no greater than 2,000 foot intervals along transmission mains.

G. The chain of custody letters for all disinfection sampling shall be turned into the Design Engineer and the University Utility Services Supervisor.

H. The interior of the pipe fittings and accessories shall be kept clean and free from dirt; pipe shall be cleaned before installation; and shall be protected during installation to prevent debris entering pipe.

I. During periods when pipe installation is not in progress, open ends of installed pipe shall be protected by means of water-tight plug or other means satisfactory to the Architect/Engineer.

J. All joints of pipe in trench shall be made up tightly before stopping work at night.

K. After water mains are installed and pressure tested, they shall be dechlorinated prior to flushing thoroughly, either through fire hydrants or by means of taps at the end of the mains (taps shall be large enough to ensure a cleaning velocity of at least 3.0 f.p.s. in mains).

L. Should the flushed water not be dechlorinated, it shall be put into a temporary holding basin for natural de-chlorination.

M. The Contractor shall furnish all chemical feed pumps, generator sets, valves, connections, materials, labor and equipment required for proper disinfection of the mains.

N. The Contractor shall prepare reports of purging and disinfecting activities and submit them to the Engineer, the University Utility Services Supervisor, and the University Water Treatment Specialist.

O. After approval of all bacteriological testing written approval from the Utilities Services Supervisor must be obtained in order to connect to the system.

END OF SECTION

SECTION 22 13 13 - FACILITY SANITARY SEWERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe and fittings.
   2. Nonpressure and pressure couplings.
   3. Expansion joints and deflection fittings.
   4. Backwater valves.
   5. Cleanouts.
   6. Manholes.

1.2 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Expansion joints and deflection fittings.

B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

B. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

PART 2 PRODUCTS

2.1 DUCTILE-IRON GRAVITY SEWER

A. Piping and Fittings
   1. Ductile iron pipe and fittings shall be cement mortar lined with asphaltic seal coat in accordance with ANSI/AWWA A21.4/C104. Ductile iron pipe shall also be furnished with outside asphaltic coating of 1 mil thickness per ANSI/AWWA A21.51/C151. Pipe shall be installed such that the pipe bell is upstream of the pipe spigot.
   2. All ductile iron pipe and fittings shall have a minimum pressure class rating of 350.

3. Joints for ductile iron pipe to be installed underground shall be push-on joint type, in compliance with ANSI/AWWA A21.11-07/C11.
4. Gaskets for push-on joint type shall be styrene butadiene rubber.

2.2 CLEANOUTS

A. Ductile-Iron Cleanouts:
   1. Description: Cleanout piping shall be 4" Ductile Iron pipe. Contractor to provide all fitting s necessary in order to reduce from main line pipe diameter to 4" diameter cleanout piping. Plug to be 4" Ductile Iron plug, M.J.
   2. Top-Loading Classification(s): Heavy Duty.
   3. Sewer Pipe Fitting and Riser to Cleanout: ductile-iron pipe and fittings.

2.3 MANHOLES

A. Precast reinforced concrete manholes shall meet the requirements of ASTM C-

B. 478. Concrete shall have a minimum compressive strength of 4,000psi at 28 days. Cement shall be Type II with C3A content of 6.5% or less. Manhole connections for sewer piping smaller than 24" shall be accomplished through the use of flexible connectors, connections for sewer piping 24" or larger should be accomplished using mortar comprised of 1 part Portland Type II cement and 2 parts sand by volume.

C. Manholes shall have interior surfaces coating of high-build glass-flake cementitious epoxy to dry film thickness of not less than 20 mils. Cementitious epoxy coating shall be PCS-9043 Type II, Permite Coatings, Coal Tar Epoxy coating or approved equal, to dry film thickness of not less than 30 mils or be impregnated with a concrete waterproofing cementitious crystalline admixture such as Xypex.

D. Manhole base and riser sections shall be equipped with non-penetrating lifting inserts, Press-Seal Gasket Corporation or approved equal, and adhere to the following thicknesses:

E. Floor Slab – Minimum 6-inch thick

F. Walls – Minimum 4-inch thick

G. Manhole cone section shall be eccentric type, equipped with non-penetrating lifting inserts, Press-Seal Gasket Corporation or approved equal, and be suitable for mounting cast iron manhole frames and covers as described below.

H. Joints between manhole sections shall be offset tongue and groove type and shall utilize a pre-lubricated manhole gasket which meets the following requirements:
   1. Gasket shall consist of a compression section and a serrated mantel section which slides over the compression section as the manhole sections are placed together.
   2. Gasket shall meet the requirements of ASTM C 443, Tylox Super-Seal as manufactured by Hamilton Kent or approved equal.

I. Manhole frames and covers shall be cast from gray iron meeting the requirements of ANSI A48-83, Class 30 or greater conforming to the following:
   1. All manhole covers shall be self-sealing type with non-penetrating pick holes.
   2. Frames and covers installed in open areas shall weigh not less than 290 lbs. Frames and covers subject to traffic shall be H 20 rated and shall weigh not less than 375 lbs.
   3. Covers shall be labeled "SANITARY SEWER".

J. Manhole steps shall conform to one of the following requirements:

1. Gray Iron or Ductile Iron integrally cast into the manhole barrel, meeting the requirements of ANSI A48-83.
2. Gray Iron or Ductile Iron equipped with inserts integrally cast into the manhole barrel having steps bolted on, meeting the requirements of ANSI A48-83.
3. Copolymer polypropylene plastic, meeting the requirements of ASTM D 2146 reinforced with a ½" diameter deformed bar meeting the requirements of ASTM A 615.
4. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
5. Manhole inverts shall be constructed of mortar comprised of 1 part Portland Type II cement and 2 parts sand by volume. Inverts should be hand troweled to sa smooth finish. Top of invert shall be a minimum of 8" wide to allow crawler type camera accessibility. To accommodate for wider inverts manholes shall be designed and constructed utilizing 2 tenths of a foot (0.2' or 2.4") drop across each manhole or match crown at pipe size changes. In the event 2 tenths of a foot (0.2' or 2.4") drop across the manhole is not possible a 5' diameter Type I base section shall be utilized and the top of the invert cannot be less than 8: wide.

2.4 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
   1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
   2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity-flow, nonpressure, drainage piping according to the following:
   1. Pipe shall be installed such that the pipe bell is upstream of the pipe spigot.
   2. Install piping with 36-inch minimum cover.
   3. Install ductile-iron, gravity sewer piping according to ASTM A 746.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:
   1. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.

3.4 MANHOLE INSTALLATION

A. General: Install manholes complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Install FRP manholes according to manufacturer's written instructions.

D. Form continuous concrete channels and benches between inlets and outlet.

E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

F. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
   1. Use Heavy-Duty, top-loading classification cleanouts.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 2’ x 2’ x 6” deep. Set with tops flush with finished grade in paved areas and 1” above finished grade in landscaped areas.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains

B. Make connections to existing piping and underground manholes.
   1. Use commercially manufactured TEE fittings for piping branch connections. Remove section of existing pipe, install TEE fitting into existing piping, and encase entire TEE fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install TEE fitting into existing piping, and encase entire TEE with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into underground manholes by cutting opening into existing unit large enough to installation of water tight neoprene boot. Cut end of connection pipe passing through structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Connect to grease, oil, sand, and acid delution interceptors specified in Section 221323 "Sanitary Waste Interceptors."

3.8 IDENTIFICATION

A. Comply with requirements in Section 31200 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
1. All new sanitary sewer laterals and mains shall include underground warning tape placed 1’ above pipe during pipe backfill operations. Warning tape shall be non-conductive Poly 3” wide with 1” lettering 4 mils thick. Warning tape shall conform to American Public Works Association (APWA) uniform color codes and shall read “BURIED SEWER LINE”.

3.9 FIELD QUALITY CONTROL

A. Sanitary Sewer - New Installation Testing
1. All visible or audible leaks in any section of the sewer, manholes, or appurtenances shall be repaired.
2. Comprehensive quality assurance program including visual inspection, TV/video recordings, and air testing shall be performed to ensure sewers are uniformly bedded and backfilled, all joints are tight with fully compressed gaskets, confirm that no joint opening exceeds ¼”, lines have smooth and uniform interior sections with respect to surfaces, grade, and alignment and confirm that lines are watertight within allowable limits.
3. TV Video Inspection: Using equipment specifically designed for sewer inspection, provide a video report (digital format) for review and approval by Designer for every segment of new sanitary sewer line and. Final approved video and report shall be submitted with the closeout documents. Media shall be clearly labeled and cross referenced to an Auburn University utility map obtained from the University Project Lead.

B. Low Pressure Air Testing
1. Newly constructed sanitary sewer mains shall be watertight within allowable limits.

2. The total quantity of infiltration into the sewer (including manholes) shall not exceed 50 gallons per mile of sewer per inch of inside diameter per 24 hours and in no case shall it exceed 2,500 gallons per mile per 24 hours.
3. In order that final testing of the sewers not be deferred until the sewers are operating under 'wet weather' and high water table conditions, and that surface restoration work can closely follow construction work. The "low-pressure air testing procedure" shall be employed in order to determine the probable acceptability of the sewers as reasonably watertight conduits (within the limits specified) when operating under 'wet weather' and high water table conditions.
4. Sewers of sizes 30" and larger will be examined for leaks and/or other interior deficiencies by making a complete interior examination of the pipelines.
5. Sewers smaller than 30" shall be tested.
6. If the elevation of the ground water table, at the time of the last visual examination and measurement of leakage should have been less than two (2) feet over the top of the pipe throughout the entire length of the test, the section shall then be tested for exfiltration by use of low-pressure air testing practice as set forth in ASTM C969.
7. The "low-pressure air test" shall generally conform to the hereinafter outlined procedure:
    a. Designer shall specify cleaning procedure to be utilized prior to testing.
    b. If the pipe to be tested is subject to external pressure exerted by elevation of ground water table, the elevation of ground water table (with reference to invert of sewer) shall be determined. This may be done by either of the following methods: (1) Insert a pipe probe through backfill to elevation of invert by boring or jetting. Equip top end of probe with a bubbler head. Slowly pass air through bubbler head and probe. Read pressure from air gauge mounted on bubbler head. All base gage pressures specified for the test shall be increased by gage reading. Gage shall be low-pressure, wide range. (2) Install ½ inch diameter pipe through manhole wall at level approximately at top of sewer; turn down pipe outside of manhole to run to elevation of invert; and cap pipe inside of manhole. This should be done at the time when the manhole is constructed. When the line is to be tested remove cap, clear test pipe with compressed air, and connect clear plastic tube to test pipe. Start flow of water through pipe and tube, and read elevation of water in tube (with reference to invert of pipe). Divide reading by 2.31 and add resulting to invert of pipe). Divide reading by 2.31 and add resulting pressure (in psi) to add base gage pressures specified for the test. After all testing has been completed cap or plug test pipe at manhole wall.
    c. Add air slowly to the plugged section of the sewer under test until the internal air pressure has been raised to 4.0 psig base plus any pressure allowance representing external head as determined above.
    d. After the pre-set pressure (4.0 psig base + allowance) has been obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain the pre-set pressure, then close air supply valve.
    e. When the pressure decreased to a gage reading equal to 3.5 psig base + allowance (such gage reading being termed stabilized pressure), start stop- watch. Determine time in seconds marking drop of 1.0 psig of internal air pressure.
    f. Refer to the AIR TEST TABLE following this section to determine minimum permissible pressure holding time in seconds for particular section of sewer being tested.

8. As stated hereinabove, surface restoration shall closely follow construction work. It follows; therefore, that air testing of completed sections of sewer shall closely follow installation of the sewers in order that surface restoration work might be undertaken.
9. The Contractor shall be responsible for observance of all safety precautions and maintenance of safe conditions during air testing.
10. These precautions shall include but not be limited to ensuring that personnel not experienced in air testing procedure not be allowed to conduct the air tests and that personnel are not allowed in the manholes at ends of test sections during tests.
11. Pneumatic plugs shall be seal tested in pipe sections outside of trench before being used to plug sewers; and such test sections shall be internally pressurized to levels adequate to determine sealing efficiency of plugs.
12. Air supply lines to pneumatic plugs and to sealed section shall be equipped with pressure regulating sets.
13. Return line from sealed section shall be equipped with pressure gage to monitor pressure rise in sealed section.

AIR TEST TABLE

MINIMUM HOLDING TIME IN SECONDS
REQUIRED FOR PRESSURE TO DROP FROM 3½ TO 2½ PSIG

Pipe Size														
LF	4”	6”	8”	10”	12”	15”	18”	21”	24”	27”	30”	33”	36”	39”
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
100	18	40	70	110	158	248	356	485	634	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	158											
400	70	158												
450	70	170												
500	88													
550	07													

3.10 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION

SECTION 22 40 00 – PLUMBING FIXTURES

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the water source heat pump systems.

B. Description of Work

1. Acceptable Manufacturers:

a. Fixtures

1. American Standard
2. Kohler Company
3. Crane Company
4. Toto

b. Faucets

1. Chicago Faucet Company
2. Speakman Company
3. T & S Brass and Bronze Works, Inc.
4. Delta

c. Flush Valves

1. Sloan Valve Company
2. Delany Flush Valves
3. Zurn Industries, Inc.

d. Seats

1. Church Products, Forbes-Wright Ind., Inc.
2. Olsonite Corporation
3. Beneke Corporation
4. Bemis

e. Carriers

1. Zurn Industries, Inc.
2. J. R. Smith Mfg. Co.
3. Wade Div./Tyler Pipe

f. Drinking Fountains

1. Halsey Taylor - Div. Household Int. Co.
2. Elkay Mfg. Company
3. Ebco/Oasis

g. Stainless Steel Sinks
   1. Elkay Mfg. Company
   2. Just Mfg. Company

1.2 Products

A. Installation

1. Install an emergency shower and eye wash adjacent to the chemical treatment feeder system, and in other locations as required by code or as indicated on the drawings.

END OF SECTION

SECTION 23 01 00 - GENERAL MECHANICAL REQUIREMENTS

1.1 GENERAL

A. Summary

1. Elements of the Scope of Work include, but are not limited to, labor, materials, equipment, supplies, storage, transportation and all required permits, fees and licenses.

B. Reference Standards

1. A. All work shall comply with the most recently revised versions of all local, state and federal codes, ordinances of the authority having jurisdiction, laws, rules and regulations.

C. Existing Conditions

1. Work in existing areas will be field coordinated.

D. Definitions

1.2 PRODUCTS

A. Manufacturer’s

1. All bids shall be based on material specified.

B. Basis of Design

C. Shop Drawings and Product data

1. Shop drawings will be provided by the contractor prior to any work on site.

D. As-Built Drawings

1. The Contractor shall maintain on a daily basis at the Project site a complete set of “Record Drawings”.

1.3 EXECUTION

A. Installation

B. Structural Fittings

1. Furnish and install the necessary sleeves, inserts, hangers, anchor bolts, and related structural items.
2. Flashing
3. Cutting and Patching

C. Weatherproof Equipment

D. Cleaning

E. Tests & Demonstrations

1. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

F. Warranties

1. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter. The warranty shall include parts and labor.

END OF SECTION

SECTION 23 05 29 – HANGERS & SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 GENERAL

A. Related Documents

B. Description of Work

1. Provide pipe hangers, supports, and required appurtenances as specified and indicated

C. Quality Assurance

1. Acceptable Manufacturers: ITT Grinnell Corporation, Fee and Mason, Central Iron Manufacturing Company, F& S Manufacturing Company, Anvil International & B-Line.

1.2 PRODUCTS

A. Pipe Hangers and Supports

1. Inserts: Provide Grinnell No. 282 for concrete construction.
2. Piping in Multiple Parallel Runs: Provide Grinnell No. 45 or No. 50 with Grinnell No. 137 U-bolt pipe clamps or structural channels or angles with U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown.
3. Piping in Single Runs: Provide Fee and Mason Fig. 239 or Grinnell No. 260 clevis hanger.
4. Hanger Rods
5. Riser Clamps
6. Saddles & Shields
7. Piping on Roof

1.3 EXECUTION

A. Installation

1. Independent Support
2. Provisions for Movement
3. Insulated piping
4. Spacing of hangers per code.
5. Saddles
6. Guides
7. Anchors
8. Leveling
9. Vibration Isolation
10. Riser Supports

END OF SECTION

SECTION 23 05 48 – VIBRATION ISOLATION

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the vibration isolation systems.

B. Description of Work

1. Provide vibration isolation work as specified and indicated.

C. Quality Assurance

1. Acceptable Manufacturers: Amber-Booth, Vibrations Mounting and Controls, Inc., Korfund Dynamics Corporation, Consolidated Kinetics Corporation.

1.2 PRODUCTS

A. Materials

1. Chilled, Condenser and Heating Hot Water Pumps
2. Suspended Fans
3. Cooling Towers
4. Fluid Cooler Mounted on Ground
5. Suspended Heat Pump Units
6. Suspended Fan & Coil Units
7. Flexible Pipe Connections at Cooling Tower
8. Flexible Pipe Connections at Rotating Equipment
9. Flexible Ductwork Connections to Equipment
10. Roof Mounted Air Handling Units

1.3 EXECUTION

A. Isolator Performance

1. Comply with the minimum static deflections recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers.

B. Related Work Examination

1. Installer of vibration isolation work shall observe the installation of other work related to and connected to vibration isolation work.

C. Equal Loading

END OF SECTION

SECTION 23 05 53 – HVAC EQUIPMENT AND PIPING IDENTIFICATION

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the identification of equipment and piping.

B. Description of Work

1. Identification of mechanical equipment shall consist of equipment labeling, pipe marking, and valve tagging as specified hereinafter.

    a. In general, all equipment shall be labeled.

    b. Pipe markings shall be applied to all piping.

    c. Each valve shall be identified with a stamped tag.

    d. Labels, tags, and markers shall comply with ANSI A13.1 and other applicable state and local standards for lettering size, colors, and length of color field.

C. Acceptable Manufacturers

1. Labels, markings, and tags shall be manufactured by W.H. Brady, Seton, Allen, or Industrial Safety Supply.

1.2 PRODUCTS

A. Equipment Labeling

1. Permanently Attached
2. Stencil Painted

B. Pipe Markings

1. On piping less than 6” diameter, install plastic semi-rigid snap-on type.
2. On piping and insulation 6” and greater diameter, full band as specified above or strip-type markers fastened to the pipe.
3. Provide arrows for direction of flow.

C. Valve Tags

1. Valve tags shall be polished brass or plastic laminate with solid brass S hook and chain.
2. Valve Schedule

1.3 EXECUTION

A. General

1. Provide after insulation is complete.
2. Coordination
3. Unit Designation
4. Placement of Markers
5. Placement of Valve Tags

END OF SECTION

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the testing, adjusting, and balancing of HVAC systems.

B. Description of Work

1. All air and water systems shall be tested, adjusted, and balanced to optimize operating and comfort conditions Acceptable Manufacturers.

C. Quality Assurance

1.2 PRODUCTS

Not Applicable.

1.3 EXECUTION

A. Test Data

1. Record test data after balancing has been completed and deliver recorded data to the Engineer for review and evaluation.

B. Calibration Test

C. Preliminary Air Testing

1. Preliminary air tests shall be performed before duct work or equipment is enclosed in walls, floors, ceilings, chases, or in any other way concealed from view.

D. Final Air Balance

1. Verify correct rotation of rotating equipment.
2. Check air filters or filter media.
3. Airflow at each unit.
4. Water flow at each unit.
5. Coil Temperatures.
6. Outlet Airflow.

END OF SECTION

SECTION 23 07 00 – HVAC INSULATION

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the insulation of HVAC and Plumbing piping, duct, and equipment.

B. Quality Assurance

1. Approved Manufacturers are Armstrong, Calsite, Cell-U-Foarm Corp, Ceelco, Certainteed Corp, Dow Chemical Company, Forrest Mfg Co, Foster / Chilers, Gemco, Johns Manville, Knauf Fiberglass, Midwest Fastners, Owens Corning Fiberglass, Pittsburg Corning Fiberglass, Rubatex, Trymer, and Venture Tape.

C. Submittals

1. Product Data

a. Type A Insulation

b. Type B Insulation

c. Type C Insulation

d. Type D Insulation

e. Type E Insulation

f. Type F Insulation

g. Type G Insulation

h. Vinyl Lacquer Paint for Type B Insulation

i. Metal Jacket

D. Definitions

1.2 PRODUCTS

A. Piping Insulation

1. Type A – Fiberglass (indoor)
2. Type B – Closed Cell (indoor)
3. Type C – Polyioscyanurate (outdoor)
4. Type Da – Cellular glass

B. Equipment Insulation

1. Type Dh – Fiberglass Board (Hot Equipment)

2. Type Dc – Foamed Plastic (Cold Equipment)
3. Type E – Calcium Silicate

C. Ductwork Installation

1. Type F – Duct Wrap
2. Type G – Duct Liner

D. Metal Jacket

E. Insulation Accessories

1.3 EXECUTION

A. Insulation Applicability

1. Interior Chilled Water – Type Da insulation 1-1/2 inches thick for pipe sizes up to 1-1/4 inch, and 2 inch thick insulation for pipe sizes 1-1/2 inches and up.
2. Interior Hot Water and Steam – Type A insulation 1-1/2 inches thick for pipes up to 1-1/2 inches, 2 inch thick insulation for pipes 3 inches and up.
3. Condensate Drains (except in plenums and fire partitions/floors) – Type B insulation ½ inch thick for all pipe sizes.
4. Condensate Drains (inside plenums and fire partitions/floors) – Type A insulation ½ inch thick for pipes up to 1 inch, ¾ inch thick insulation for pipes 1-1/4 inch and up.
5. Refrigerant Suction Lines & Valves (except in plenums and fire partitions/floors) – Type B insulation 1 inch thick for all pipe sizes.
6. Refrigerant Suction Lines & Valves (in plenums and fire partitions/floors) and hot gas bypass piping – Type A insulation 1 inch thick for all pipe sizes.
7. Medium Pressure Supply Ducts – Type F insulation 2 inches thick for all pipe sizes.
8. Low Pressure Supply Ducts – Type F insulation 2 inches thick for all pipe sizes.
9. Outside Air Ductwork – No insulation required.
10. Cold Equipment – Type Dc insulation, minimum of ½ inch.
11. Hot Equipment – Type Dh insulation, minimum of 2 inches.

B. Piping Insulation General Requirements

1. Preparation
2. Application
3. Application at Fittings

C. Type A Installation

D. Type B Installation

E. Type C Installation

F. Type D and E Installation

G. Type F Installation

H. Type G Installation

I. Metal Jacket Installation

J. Hangers

K. Pipe Sleeves

END OF SECTION

SECTION 23 09 00 – DIRECT DIGITAL CONTROLS

1.1 GENERAL

A. Related Documents

1. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades.

B. Definitions

C. BMS Description

D. Quality Assurance

1. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.

E. References

F. Submittals

G. Record Documentation

H. Warranty

1. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.

1.2 PRODUCTS

A. General Description

B. BMS Architecture

C. User Interface

D. Network Automation Engines

E. DDC System Controllers

F. Field Devices

G. System Tools

H. Input Devices

I. Output Devices

J. Miscellaneous Devices

1.3 EXECUTION

A. Factory Testing

B. Field Quality Control

C. Local Control Panels

1.4 PERFORMANCE/ EXECUTION

A. BMS Specific Requirements

B. Installation Practices

C. Training

D. Commissioning

END OF SECTION

23 09 00 - DIRECT DIGITAL CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All work of this Division shall be coordinated and provided by the single Building Management System (BMS) Contractor.

B. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 15 Sections for details.

C. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.

D. If the BMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.2 DEFINITIONS

A. Analog: A continuously variable system or value not having discrete levels. Typically exists within a defined range of limiting values.

B. Binary: A two-state system where an “ON” condition is represented by one discrete signal level and an “OFF” condition is represented by a second discrete signal level.

C. Building Management System (BMS): The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division BMS Contractor and to be interfaced to the associated work of other related trades.

D. BMS Contractor: The single Contractor to provide the work of this Division. This Contractor shall be the primary manufacturer, installer, commissioner and ongoing service provider for the BMS work.

E. Control Sequence: An BMS pre-programmed arrangement of software algorithms, logical computation, target values and limits as required to attain the defined operational control objectives.

F. Direct Digital Control: The digital algorithms and pre-defined arrangements included in the BMS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions, constant values, timing considerations and the like.

G. BMS Network: The total digital on-line real-time interconnected configuration of BMS digital processing units, workstations, panels, sub-panels, controllers, devices and associated elements individually known as network nodes. May exist as one or more fully interfaced and integrated sub-networks, LAN, WAN or the like.

H. Node: A digitally programmable entity existing on the BMS network.

I. BMS Integration: The complete functional and operational interconnection and interfacing of all BMS work elements and nodes in compliance with all applicable

codes, standards and ordinances so as to provide a single coherent BMS as required by this Division.

J. Provide: The term “Provide” and its derivatives when used in this Division shall mean to furnish, install in place, connect, calibrate, test, commission, warrant, document and supply the associated required services ready for operation.

K. PC: IBM-compatible Personal Computer from a recognized major manufacturer

L. Furnish: The term “Furnish” and its derivatives when used in this Division shall mean supply at the BMS Contractor’s cost to the designated third party trade contractor for installation. BMS Contractor shall connect furnished items to the BMS, calibrate, test, commission, warrant and document.

M. Wiring: The term “Wiring” and its derivatives when used in this Division shall mean provide the BMS wiring and terminations.

N. Install: The term “Install” and its derivatives when used in this Division shall mean receive at the jobsite and mount.

O. Protocol: The term “protocol” and its derivatives when used in this Division shall mean a defined set of rules and standards governing the on-line exchange of data between BMS network nodes.

P. Software: The term “software” and its derivatives when used in this Division shall mean all of programmed digital processor software, preprogrammed firmware and project specific digital process programming and database entries and definitions as generally understood in the BMS industry for real-time, on-line, integrated BMS configurations.

Q. The use of words in the singular in these Division documents shall not be considered as limiting when other indications in these documents denote that more than one such item is being referenced.

R. Headings, paragraph numbers, titles, shading, bolding, underscores, clouds and other symbolic interpretation aids included in the Division documents are for general information only and are to assist in the reading and interpretation of these Documents.

S. The following abbreviations and acronyms may be used in describing the work of this Division:

ADC	-	Analog to Digital Converter
AI	-	Analog Input
AN	-	Application Node
ANSI	-	American National Standards Institute
AO	-	Analog Output
ASCII	-	American Standard Code for Information Interchange
ASHRAE		American Society of Heating, Refrigeration and Air Conditioning Engineers
AWG	-	American Wire Gauge
CPU	-	Central Processing Unit
CRT	-	Cathode Ray Tube
DAC	-	Digital to Analog Converter
DDC	-	Direct Digital Control
DI	-	Digital Input
DO	-	Digital Output
EEPROM	- Only	Electronically Erasable Programmable Read Memory

EMI	-	Electromagnetic Interference
FAS	-	Fire Alarm Detection and Annunciation System
GUI	-	Graphical User Interface
HOA	-	Hand-Off-Auto
ID	-	Identification
IEEE	-	Institute of Electrical and Electronics Engineers
I/O	-	Input/Output
LAN	-	Local Area Network
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MCC	-	Motor Control Center
NC	-	Normally Closed
NIC	-	Not In Contract
NO	-	Normally Open
OWS	-	Operator Workstation
OAT	-	Outdoor Air Temperature
PC	-	Personal Computer
RAM	-	Random Access Memory
RF	-	Radio Frequency
RFI	-	Radio Frequency Interference
RH	-	Relative Humidity
ROM	-	Read Only Memory
RTD	-	Resistance Temperature Device
SPDT	-	Single Pole Double Throw
SPST	-	Single Pole Single Throw
XVGA	-	Extended Video Graphics Adapter
TBA	-	To Be Advised
TCP/IP	-	Transmission Control Protocol/Internet Protocol
TTD	-	Thermistor Temperature Device
UPS	-	Uninterruptible Power Supply
VAC	-	Volts, Alternating Current
VAV	-	Variable Air Volume
VDC	-	Volts, Direct Current
WAN	-	Wide Area Network

1.3 BMS DESCRIPTION

A. The Building Management System (BMS) shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be Johnson Controls fully compatible existing devices that mount and communicate directly Auburn IT infrastructure across campus for uploading and downloading of controller are required, alarming, metering and energy management. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the FMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.

B. All points of user interface are existing and shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser.

C. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this Division specifications together with the associated Point Sheets

and Drawings and the associated interfacing work as referenced in the related documents.

D. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

E. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

F. Manage and coordinate the BMS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as to not impede or delay the work of associated trades.

G. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:

1. Operator information, alarm management and control functions.
2. Enterprise-level information and control access.
3. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.
4. Diagnostic monitoring and reporting of BMS functions.
5. Offsite monitoring and management access.
6. Energy management
7. Standard applications for terminal HVAC systems.

1.4 QUALITY ASSURANCE

A. General

1. The Building Management System Contractor shall be the primary manufacturer-owned branch office that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems.

2. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.

3. As evidence and assurance of the contractor’s ability to support the Owner's system with service and parts, the contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.

4. The Building Management System architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Management Systems, and shall be the manufacturer’s latest standard of design at the time of bid.

B. Workplace Safety And Hazardous Materials

1. Provide a safety program in compliance with the Contract Documents.

2. The FMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
3. The Contractor and its employees and subtrades comply with federal, state and local safety regulations.
4. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA have jurisdiction for at least each topic listed in the Safety Certification Manual.
5. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.
6. Hazards observed but not created by the Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The Contractor shall be required to avoid the hazard area until the hazard has been eliminated.
7. The Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.
8. The Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.
9. The Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

C. QUALITY MANAGEMENT PROGRAM

1. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manger shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:

   a. Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
   b. Manage the financial aspects of the BMS Contract.
   c. Coordinate as necessary with other trades.
   d. Be responsible for the work and actions of the BMS workforce on site.

1.5 REFERENCES

A. All work shall conform to the following Codes and Standards, as applicable:

1. National Fire Protection Association (NFPA) Standards.
2. National Electric Code (NEC) and applicable local Electric Code.
3. Underwriters Laboratories (UL) listing and labels.

4. UL 864 UUKL Smoke Control
5. UL 268 Smoke Detectors.
6. UL 916 Energy Management
7. NFPA 70 - National Electrical Code.
8. NFPA 90A - Standard For The Installation Of Air Conditioning And Ventilating Systems.
9. NFPA 92A and 92B Smoke Purge/Control Equipment.
10. Factory Mutual (FM).
11. American National Standards Institute (ANSI).
12. National Electric Manufacturer's Association (NEMA).
13. American Society of Mechanical Engineers (ASME).
14. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) [user note: add ASHRAE 62 IAQ as applicable].
15. Air Movement and Control Association (AMCA).
16. Institute of Electrical and Electronic Engineers (IEEE).
17. American Standard Code for Information Interchange (ASCII).
18. Electronics Industries Association (EIA).
19. Occupational Safety and Health Administration (OSHA).
20. American Society for Testing and Materials (ASTM).
21. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.
22. Americans Disability Act (ADA)
23. ANSI/EIA 909.1-A-1999 (LonWorks)
24 ANSI/ASHRAE Standard 195-2004 (BACnet)

B. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

C. All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.6 SUBMITTALS

A. Shop Drawings, Product Data, and Samples

1. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.
2. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
3. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.
4. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

5. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
6. The BMS Contractor shall correct any errors or omissions noted in the first review.
7. At a minimum, submit the following:
   a. BMS network architecture diagrams including all nodes and interconnections.
   b. Systems schematics, sequences and flow diagrams.
   c. Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
   d. Samples of Graphic Display screen types and associated menus.
   e. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
   f. Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
   ~~g.~~ Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
   ~~h.~~ Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address
   i. Details of all BMS interfaces and connections to the work of other trades.
   j. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.7 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals

1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:

   a. Table of contents.
   b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
   c. Manufacturers product data sheets or catalog pages for all products including software.
   d. System Operator’s manuals.
   e. Archive copy of all site-specific databases and sequences.
   f. BMS network diagrams.
   g. Interfaces to all third-party products and work by other trades.

2. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.8 WARRANTY

A. Standard Material and Labor Warranty:

1. Provide a one-year labor and material warranty on the BMS.
2. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.
3. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

PART 2 – PRODUCTS

2.1 GENERAL DESCRIPTION

A. The Building Management System (BMS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.

B. The Building Management System shall consist of the following:

1. Standalone Network Automation Engine(s)
2. Field Equipment Controller(s)
3. Input/Output Module(s)
4. Local Display Device(s)
5. Portable Operator's Terminal(s)
6. Distributed User Interface(s)
7. Network processing, data storage and communications equipment
8. Other components required for a complete and working BMS

C. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.

D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

1. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2. The System shall maintain all settings and overrides through a system reboot.

E. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

1. The System shall comply with the following International Code Council (ICC) Codes:
   a. Building Officials and code Administrators International (BOMA) model code
   b. International Conference of Building Officials (ICBO) model code
   c. Southern Building Code Congress International (SBCCI) regulations

F. Acceptable Manufacturers

1. Johnson Controls, Metasys

2.2 BMS ARCHITECTURE

A. Automation Network

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard “off the shelf” products available through normal PC vendor channels.
2. The automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
3. Network Automation Engines (NAE) shall reside on the automation network.
4. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

B. Control Network

1. Network Automation Engines (NAE) shall provide supervisory control over the control network and shall support the following communication protocols:
   a. BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9
   ◊ The NAE shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
   ◊ The NAE shall be tested and certified as a BACnet Building Controller (B-BC).
   b. The Johnson Controls N2 Field Bus.
2. Control networks shall provide either “Peer-to-Peer,” Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
3. DDC Controllers shall reside on the control network.
4. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.
5. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
6. The PICS shall be submitted 10 days prior to bidding.

2.3 USER INTERFACE

A. Dedicated Web Based User Interface

1. Where indicated on plans the BMS Contractor shall provide and install a personal computer for command entry, information management, network alarm management, and database management functions. All real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Automation Engines to facilitate greater fault tolerance and reliability.
2. Dedicated User Interface Architecture – The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically it must be implemented to conform to the following interface standards.
    a. Microsoft Internet Explorer for user interface functions
    b. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions
    c. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports
    d. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries
3. (EXISTING NOT REQUIRED) PC Hardware – The personal computer(s) shall be configured as follows:
4. Operating System Software
    a. Windows XP Professional
    b. Where user interface is not provided via browser, provide complete operator workstation software package, including any hardware or software keys. Include the original installation disks and licenses for all included software, device drivers, and peripherals.
    c. Provide software registration cards to the Owner for all included software.

B. Distributed Web Based User Interface

1. All features and functions of the dedicated user interface previously defined in this document shall be available on any computer connected directly or via a wide area or virtual private network (WAN/VPN) to the automation network and conforming to the following specifications.
2. The software shall run on the Microsoft Internet Explorer (6.0 or higher) browser.

C. User Interface Application Components

1. Operator Interface
    a. An integrated browser based client application shall be used as the user operator interface program.
    b. The System shall employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user.
    c. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.

d. The user interface software shall provide help menus and instructions for each operation and/or application.
e. The system shall support customization of the UI configuration and a home page display for each operator.
f. The system shall support user preferences in the following screen presentations:

- ◊ Alarm
- ◊ Trend
- ◊ Display
- ◊ Applications

g. All controller software operating parameters shall be displayed for the operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.
h. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:

- ◊ User access for selective information retrieval and control command execution
- ◊ Monitoring and reporting
- ◊ Alarm, non-normal, and return to normal condition annunciation
- ◊ Selective operator override and other control actions
- ◊ Information archiving, manipulation, formatting, display and reporting
- ◊ FMS internal performance supervision and diagnostics
- ◊ On-line access to user HELP menus
- ◊ On-line access to current FMS as-built records and documentation
- ◊ Means for the controlled re-programming, re-configuration of FMS operation and for the manipulation of FMS database information in compliance with the prevailing codes, approvals and regulations for individual FMS applications

i. The system shall support a list of application programs configured by the users that are called up by the following means:

- ◊ The Tools Menu
- ◊ Hyperlinks within the graphics displays
- ◊ Key sequences

j. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable.

2. Navigation Trees
   a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.

b. Provide the ability for the operator to add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.

c. The navigation trees shall be "dockable" to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar or closed altogether. A simple keystroke will reattach the navigation to the primary display of the user interface.

3. Alarms

a. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:

- ◊ Log date and time of alarm occurrence.
- ◊ Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
- ◊ Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
- ◊ Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
- ◊ Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
- ◊ Any attribute of any object in the system may be designated to report an alarm.

b. The FMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions.

c. The FMS shall allow a minimum of 4 categories of alarm sounds customizable through user defined wav.files.

d. The FMS shall annunciate application alarms at minimum, as required by Part 3.

4. Reports and Summaries

a. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:

- ◊ All points in the BMS
- ◊ All points in each BMS application
- ◊ All points in a specific controller
- ◊ All points in a user-defined group of points
- ◊ All points currently in alarm
- ◊ All points locked out
- ◊ All BMS schedules

- ◊ All user defined and adjustable variables, schedules, interlocks and the like.

b. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
c. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
d. The system shall allow for the creation of custom reports and queries via a standard web services XML interface and commercial off-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports.

5. Schedules
   a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
      - ◊ Weekly schedules
      - ◊ Exception Schedules
      - ◊ Monthly calendars
   b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
   c. It shall be possible to define one or more exception schedules for each schedule including references to calendars
   d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.
   e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.
   f. Schedules and Calendars shall comply with ASHRAE SP135/2003 BACnet Standard.
   g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.
6. Password
   a. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
   b. Each user shall have the following: a user name (24 characters minimum), a password (12 characters minimum), and access levels.
   c. The system shall allow each user to change his or her password at will.
   d. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
   e. A minimum of five levels of access shall be supported individually or in any combination as follows:
      - ◊ Level 1 = View Data
      - ◊ Level 2 = Command

- ◊ Level 3 = Operator Overrides
- ◊ Level 4 = Database Modification
- ◊ Level 5 = Database Configuration
- ◊ Level 6 = All privileges, including Password Add/Modify

f. A minimum of 100 unique passwords shall be supported.

g. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.

h. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.

7. Screen Manager

a. The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.

8. Dynamic Color Graphics

a. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.

b. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.

The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.

c. Graphics runtime functions – A maximum of 16 graphic applications shall be able to execute at any one time on a user interface or workstation with 4 visible to the user. Each graphic application shall be capable of the following functions:

- ◊ All graphics shall be fully scalable
- ◊ The graphics shall support a maintained aspect ratio.
- ◊ Multiple fonts shall be supported.
- ◊ Unique background shall be assignable on a per graphic basis.
- ◊ The color of all animations and values on displays shall indicate if the status of the object attribute.

d. Operation from graphics – It shall be possible to change values (setpoints) and states in system controlled equipment by using drop-down windows accessible via the pointing device

e. Graphic editing tool – A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all animations, and defining all runtime binding.

- ◊ The graphic editing tool shall in general provide for the creation and positioning of point objects by dragging from tool bars or drop-downs and positioning where required.
- ◊ In addition, the graphic editing tool shall be able to add additional content to any graphic by importing backgrounds in the SVG, BMP or JPG file formats.

f. Aliasing – Many graphic displays representing part of a building and various building components are exact duplicates, with the exception that the various variables are bound to different field values. Consequently, it shall be possible to bind the value of a graphic display to aliases, as opposed to the physical field tags.

9. Historical trending and data collection

a. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:

- ◊ Any point, physical or calculated, may be designated for trending. Three methods of collection shall be allowed: Defined time interval Upon a change of value
- ◊ Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.

10. Trend data viewing and analysis

a. Provide a trend viewing utility that shall have access to all database points.

b. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.

c. The trend viewing utility shall have the capability to define trend study displays to include multiple trends

d. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.

e. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.

f. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.

g. Trend studies shall be capable of calculating and displaying calculated variables including highest value, lowest value and time based accumulation.

h. The Display shall support the user's ability to change colors, sample sizes, and types of markers.

11. Database Management

a. The System shall provide a Database Manager that separates the database monitoring and managing functions by supporting two separate windows.

b. Database secure access shall be accomplished using standard SQL authentication including the ability to access data for use outside of the Building Automation application.

c. The database managing function shall include summarized information on trend, alarm, event, and audit for the following database management actions:

- ◊ Backup
- ◊ Purge
- ◊ Restore

d. The Database Manager shall support four tabs:
   - ◊ Statistics – shall display Database Server information and Trend, Alarm (Event), and Audit information on the Metasys Databases.
   - ◊ Maintenance – shall provide an easy method of purging records from the Metasys Server trend, alarm (event), and audit databases by supporting separate screens for creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.
   - ◊ Backup – Shall provide the means to create a database backup file and select a storage location.
   - ◊ Restore – shall provide a restricted means of restoring a database by requiring the user to log into an Expert Mode in order to view the Restore screen.

e. The Status Bar shall appear at the bottom of all Metasys Database Manager Tabs and shall provide information on the current database activity. The following icons shall be provided:

   - ◊ Ready
   - ◊ Purging Record from a database
   - ◊ Action Failed
   - ◊ Refreshing Statistics
   - ◊ Restoring database
   - ◊ Shrinking a database
   - ◊ Backing up a database
   - ◊ Resetting internet information Services
   - ◊ Starting the Metasys Device Manager
   - ◊ Shutting down the Metasys Device Manager
   - ◊ Action successful

f. The Database Manager monitoring functions shall be accessed through the Monitoring Settings window and shall continuously read database information once the user has logged in.

g. The System shall provide user notification via taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

h. The Monitoring Settings window shall have the following sections:

   - ◊ General – Shall allow the user to set and review scan intervals and start times.
   - ◊ Email – Shall allow the user to create and review e-mail and phone text messages to be delivered when a Warning or Alarm is generated.
   - ◊ Warning – shall allow the user to define the Warning limit parameters, set the Reminder Frequency, and link the e-mail message.

- ◊ Alarm – shall allow the user to define the Alarm limit parameters, set the Reminder Frequency, and link the e-mail message.
- ◊ Database login – Shall protect the system from unauthorized database manipulation by creating a Read Access and a Write Access for each of the Trend, Alarm (Event) and Audit databases as well as an Expert Mode required to restore a database.

i. The Monitoring Settings Taskbar shall provide the following informational icons:

- ◊ Normal – Indicates by color and size that all databases are within their limits.
- ◊ Warning - Indicates by color and size that one or more databases have exceeded their Warning limit.
- ◊ Alarm - Indicates by color and size that one or more databases have exceeded their Alarm limit.

j. The System shall provide user notification via Taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

2.4 NETWORK AUTOMATION ENGINES (NAE)

A. Network Automation Engine (NAE 35XX)

1. The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Automation Engines.
2. Automation network – The NAE shall reside on the automation network and shall support a subnet of system controllers.
3. User Interface – Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.
   a. The web based UI software shall be imbedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.
   b. The NAE shall support a minimum of two (2) concurrent users.
   c. The web based user shall have the capability to access all system data through one NAE.
   d. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NAE.
   e. Systems that require the user to address more than one NAE to access all system information are not acceptable.
   f. The NAE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NAE.
   g. Systems that support UI Graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.
   h. The web based UI shall support the following functions using a standard version of Microsoft Internet Explorer:

- ◊ Configuration
- ◊ Commissioning
- ◊ Data Archiving
- ◊ Monitoring
- ◊ Commanding
- ◊ System Diagnostics

i. Systems that require workstation software or modified web browsers are not acceptable.

j. The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

4. Processor – The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.

5. Memory – Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.

6. Hardware Real Time Clock – The NAE shall include an integrated, hardware-Based, real-time clock.

7. The NAE shall include troubleshooting LED indicators to identify the following conditions:
   a. Power - On/Off
   b. Ethernet Traffic – Ethernet Traffic/No Ethernet Traffic
   c. Ethernet Connection Speed – 10 Mbps/100 Mbps
   d. FC Bus – Normal Communications/No Field Communications
   e. Peer Communication – Data Traffic between NAE Devices
   f. Run – NAE Running/NAE in Startup/NAE Shutting Down/Software Not Running
   g. Bat Fault – Battery Defective, Data Protection Battery Not Installed
   h. Fault – General Fault
   i. Modem RX – NAE Modem Receiving Data
   j. Modem TX – NAE Modem Transmitting Data

8. Communications Ports – The NAE shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
   a. USB port
   b. URS-232 serial data communication port
   c. RS-485 port
   d. Ethernet port

9. Diagnostics – The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.

10. Power Failure – In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which

there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.

a. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.

b. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

11. Certification – The NAE shall be listed by Underwriters Laboratories (UL).

12. Controller network – The NAE shall support the following communication protocols on the controller network:

a. The NAE shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.

◊ The NAE shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.

◊ The NAE shall be tested and certified as a BACnet Building Controller (B-BC).

◊ A BACnet Protocol Implementation Conformance Statement shall be provided for the NAE.

◊ The Conformance Statements shall be submitted 10 days prior to bidding.

◊ The NAE shall support a minimum of 50 control devices.

2.5 DDC SYSTEM CONTROLLERS

A. Field Equipment Controller (FEC X610)

1. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.

a. The FEC shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.

◊ The FEC shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.

◊ The FEC shall be tested and certified as a BACnet Application Specific Controller (B-ASC).

◊ A BACnet Protocol Implementation Conformance Statement shall be provided for the FEC.

◊ The Conformance Statement shall be submitted 10 days prior to bidding.

2. The FEC shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

3. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.

4. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

5. The FEC shall include a removable base to allow pre-wiring without the controller.
6. The FEC shall include troubleshooting LED indicators to identify the following conditions:
   a. Power On
   b. Power Off
   c. Download or Startup in progress, not ready for normal operation
   d. No Faults
   e. Device Fault
   f. Field Controller Bus - Normal Data Transmission
   g. Field Controller Bus - No Data Transmission
   h. Field Controller Bus - No Communication
   i. Sensor-Actuator Bus - Normal Data Transmission
   j. Sensor-Actuator Bus - No Data Transmission
   k. Sensor-Actuator Bus - No Communication
7. The FEC shall accommodate the direct wiring of analog and binary I/O field points.
8. The FEC shall support the following types of inputs and outputs:
   a. Universal Inputs - shall be configured to monitor any of the following:
      ◊ Analog Input, Voltage Mode
      ◊ Analog Input, Current Mode
      ◊ Analog Input, Resistive Mode
      ◊ Binary Input, Dry Contact Maintained Mode
      ◊ Binary Input, Pulse Counter Mode
   b. Binary Inputs - shall be configured to monitor either of the following:
      ◊ Dry Contact Maintained Mode
      ◊ Pulse Counter Mode
   c. Analog Outputs - shall be configured to output either of the following
      ◊ Analog Output, Voltage Mode
      ◊ Analog Output, current Mode
   d. Binary Outputs - shall output the following:
      ◊ 24 VAC Triac
   e. Configurable Outputs - shall be capable of the following:
      ◊ Analog Output, Voltage Mode
      ◊ Binary Output Mode
9. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).
   a. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
   b. The FC Bus shall support communications between the FECs and the NAE.
   c. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE.
   d. The FC Bus shall support a minimum of 100 IOMs and FECs in any combination.
   e. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the FEC and the furthest connected device.
   f.
10. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).

a. The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
b. The SA Bus shall support a minimum of 10 devices per trunk.
c. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the FEC and the furthest connected device.

11. The FEC shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.

12. The FEC shall support, but not be limited to, the following:

a. Hot water, chilled water/central plant applications
b. Built-up air handling units for special applications

C. Terminal units

c. Special programs as required for systems control

2.6 FIELD DEVICES

A. Input/Output Module (IOM X710)

1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the FEC.
2. The IOM shall communicate with the FEC over the FC Bus or the SA Bus.
3. The IOM shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.

a. The IOM shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
b. The IOM shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
c. A BACnet Protocol Implementation Conformance Statement shall be provided for the FEC.
d. The Conformance Statement shall be submitted 10 days prior to bidding.

4. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
5. The IOM shall have a minimum of 4 points to a maximum of 17 points.
6. The IOM shall support the following types of inputs and outputs:

a. Universal Inputs - shall be configured to monitor any of the following:
◊ Analog Input, Voltage Mode
◊ Analog Input, Current Mode
◊ Analog Input, Resistive Mode
◊ Binary Input, Dry Contact Maintained Mode
◊ Binary Input, Pulse Counter Mode
b. Binary Inputs - shall be configured to monitor either of the following:
◊ Dry Contact Maintained Mode
◊ Pulse Counter Mode
c. Analog Outputs - shall be configured to output either of the following
◊ Analog Output, Voltage Mode
◊ Analog Output, current Mode
d. Binary Outputs - shall output the following:
◊ 24 VAC Triac
e. Configurable Outputs - shall be capable of the following:

◊ Analog Output, Voltage Mode
◊ Binary Output Mode

7. The IOM shall include troubleshooting LED indicators to identify the following conditions:

a. Power On
b. Power Off
c. Download or Startup in progress, not ready for normal operation
d. No Faults
e. Device Fault
f. Normal Data Transmission
g. No Data Transmission
h. No Communication

B. Network Sensors (NS-XXX700X)

1. The Network Sensors (NS) shall have the ability to monitor the following variables as required by the systems sequence of operations:

a. Zone Temperature
b. Zone Humidity
c. Zone Setpoint
d. Discharge Air Temperature

2. The NS shall transmit the information back to the controller on the Sensor-Actuator Bus (SA Bus) using BACnet Standard protocol SSPC-135, Clause 9.

3. The NS shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.

a. The NS shall be tested and certified as a BACnet Smart Sensors (B-SS).
b. A BACnet Protocol Implementation Conformance Statement shall be provided for the NS.
c. The Conformance Statement shall be submitted 10 days prior to bidding.

4. The Network Zone Sensors shall include the following items:

a. A backlit Liquid Crystal Display (LCD) to indicate the Temperature, Humidity and Setpoint
b. An LED to indicate the status of the Override feature
c. A button to toggle the temperature display between Fahrenheit and Celsius
d. A button to initiate a timed override command
e. Available in either surface mount or wall mount
f. Available with either screw terminals or phone jack

5. The Network Discharge Air Sensors shall include the following:

a. 4 inch or 8 inch duct insertion probe
b. 10 foot pigtail lead
c. Dip Switches for programmable address selection
d. Ability to provide an averaging temperature from multiple locations
e. Ability to provide a selectable temperature from multiple locations

2.7 SYSTEM TOOLS

A. System Configuration Tool (SCT)

1. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Automation Engine (NAE) or a Network Integration Engine (NIE).

2. The configuration tool shall provide an archive database for the configuration and application data.
3. The configuration tool shall have the same look-and-feel at the User Interface (UI) regardless of whether the configuration is being done online or offline.
4. The configuration tool shall include the following features:
    a. Basic system navigation tree for connected networks
    b. Integration of Metasys N1, LonWorks, and BACnet enabled devices
    c. Customized user navigation trees
    d. Point naming operating parameter setting
    e. Graphic diagram configuration
    f. Alarm and event message routing
    g. Graphical logic connector tool for custom programming
    h. Downloading, uploading, and archiving databases
5. The configuration tool shall have the capability to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
    a. BACnet Devices
    b. LonWorks devices
    c. N2 Bus devices
    d. Metasys N1 networks
6. The configuration tool shall be capable of programming the Field Equipment Controllers.
    a. The configuration tool shall provide the capability to configure, simulate, and commission the Field Equipment Controllers.
    b. The configuration tool shall allow the FECs to be run in Simulation Mode to verify the applications.
    c. The configuration tool shall contain a library of standard applications to be used for configuration.
7. The configuration tool shall be capable of programming the field devices.
    a. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.
    b. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.
    c. The configuration tool shall contain a library of standard applications to be used for configuration
8. A wireless access point shall allow a wireless enabled portable PC to make a temporary Ethernet connection to the automation network.
    a. The wireless connection shall allow the PC to access configuration tool through the web browser using the User Interface (UI).
    b. The wireless use of configuration tool shall be the same as a wired connection in every respect.
    c. The wireless connection shall use the Bluetooth Wireless Technology.

2.8 INPUT DEVICES

A. General Requirements

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

B. Temperature Sensors

1. General Requirements:
   a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
   b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
   c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Chilled Water	± .5°F.
Room Temp	± .5°F.
Duct Temperature	± .5°F.
All Others	± .75°F.

2. Room Temperature Sensors
   a. Room sensors shall be constructed for either surface or wall box mounting.
   b. Room sensors shall have the following options when specified:
      ◊ Setpoint reset slide switch providing a ±3 degree (adjustable) range.
      ◊ Individual heating/cooling setpoint slide switches.
      ◊ A momentary override request push button for activation of after-hours operation.
      ◊ Analog thermometer.

3. Room Temperature Sensors with Integral Display
   a. Room sensors shall be constructed for either surface or wall box mounting.
   b. Room sensors shall have an integral LCD display and four button keypad with the following capabilities:
      ◊ Display room and outside air temperatures.
      ◊ Display and adjust room comfort setpoint.
      ◊ Display and adjust fan operation status.
      ◊ Timed override request push button with LED status for activation of after-hours operation.
      ◊ Display controller mode.
      ◊ Password selectable adjustment of setpoint and override modes.

4. Thermo wells
   a. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
   b. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.
   c. Thermo wells and sensors shall be mounted in a threadolet or 1/2" NFT saddle and allow easy access to the sensor for repair or replacement.
   d. Thermo wells shall be constructed of 316 stainless steel.

5. Outside Air Sensors
    a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
    b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
    c. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
6. Duct Mount Sensors
    a. Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.
    b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.
    c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.
7. Averaging Sensors
    a. For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.
    b. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
    c. Capillary supports at the sides of the duct shall be provided to support the sensing string.
8. Acceptable Manufacturers: Johnson Controls, Setra.

C. Humidity Sensors
1. The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.
2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.
4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.
5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.
6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.
7. Acceptable Manufacturers: Johnson Controls, Veris Industries, and Mamac.

D. Differential Pressure Transmitters
1. General Air and Water Pressure Transmitter Requirements:

a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.
c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.

2. Low Differential Water Pressure Applications (0" - 20" w.c.)
   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.
   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
      ◊ .01-20" w.c. input differential pressure range.
      ◊ 4-20 mA output.
      ◊ Maintain accuracy up to 20 to 1 ratio turndown.
      ◊ Reference Accuracy: +0.2% of full span.
   c. Acceptable Manufacturers: Setra and Mamac.
3. Medium to High Differential Water Pressure Applications (Over 21" w.c.)
   a. The differential pressure transmitter shall meet the low pressure transmitter specifications with the following exceptions:
      ◊ Differential pressure range 10" w.c. to 300 PSI.
      ◊ Reference Accuracy: ±1% of full span (includes non-linearity, hysteresis, and repeatability).
   b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
   c. Acceptable Manufacturers: Setra and Mamac.
4. Building Differential Air Pressure Applications (-1" to +1" w.c.)
   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
      ◊ -1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)
      ◊ 4-20 mA output.
      ◊ Maintain accuracy up to 20 to 1 ratio turndown.
      ◊ Reference Accuracy: +0.2% of full span.
   c. Acceptable Manufacturers: Johnson Controls and Setra.
5. Low Differential Air Pressure Applications (0" to 5" w.c.)

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
   ◊ (0.00 - 1.00" to 5.00") w.c. input differential pressure ranges. (Select range appropriate for system application.)
   ◊ 4-20 mA output.
   ◊ Maintain accuracy up to 20 to 1 ratio turndown.
   ◊ Reference Accuracy: +0.2% of full span.
c. Acceptable Manufacturers: Johnson Controls and Setra.

6. Medium Differential Air Pressure Applications (5" to 21" w.c.)
   a. The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements:
      ◊ Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability.
      ◊ Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 PSIG.
      ◊ Thermal Effects: <+.033 F.S./Deg. F. over 40°F. to 100°F. (calibrated at 70°F.).
   b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
   c. Acceptable manufacturers: Johnson Controls and Setra.
7. Water Flow Switches
   a. Water flow switches shall be equal to the Johnson Controls P74.
8. Low Temperature Limit Switches
   a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.
   b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.
   c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
   d. The low temperature limit switch shall be equal to Johnson Controls A70.

2.9 OUTPUT DEVICES

A. Actuators
   1. General Requirements
      a. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section.
   2. Electronic Damper Actuators

a. Electronic damper actuators shall be direct shaft mount.
b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.
c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.
e. Acceptable manufacturers: Johnson Controls, Mamac.

3. Electronic Valve Actuators
   a. Electronic valve actuators shall be manufactured by the valve manufacturer.
   b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
   c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.
   d. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
   e. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end

switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.

f. Acceptable manufacturers: Johnson Controls

B. Control Dampers

1. The BMS Contractor shall furnish all automatic dampers. All automatic dampers shall be sized for the application by the BMS Contractor or as specifically indicated on the Drawings.

2. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.

3. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.

4. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 60". Damper blades shall be 16-gauge minimum and shall not exceed eight (8) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. All damper bearings shall be made of reinforced nylon, stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48"x48" size shall not leak in excess of 8.0 cfm per square foot when closed against 4" w.g. static pressure when tested in accordance with AMCA Std. 500.

5. Airfoil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" w.g., but no more than 4000 FPM or 6" w.g. Acceptable manufacturers are Johnson Controls D-7250 D-1250 or D-1300, Ruskin CD50, and Vent Products 5650.

6. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below. Acceptable manufacturers are: Johnson Controls D-1600, Ruskin CD36, and Vent Products 5800.

7. Multiple section dampers may be jack-shafted to allow mounting of piston pneumatic actuators and direct connect electronic actuators. Each end of the jackshaft shall receive at least one actuator to reduce jackshaft twist.

C. Control Relays

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.

b. Mounting Bases shall be snap-mount.

c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.

d. Contacts shall be rated for 10 amps at 120VAC.

e. Relays shall have an integral indicator light and check button.

f. Acceptable manufacturers: Johnson Controls, Lectro

D. Control Valves

1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open,

closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.

2. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary circuit pumps shall be sized for a pressure drop equal to 25% the actual coil pressure drop, but no less than 2 PSI. Mixing valves (3-way) serving secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.

3. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.

4. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.

5. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.

6. Acceptable manufacturers: Johnson Controls

2.10 MISCELLANEOUS DEVICES

E. Variable Frequency Motor Speed Control Drives

Danfoss FC100, Nema12, No Bypass, Rated for Motor being controlled.

2.11 SCOPE

A. This specification describes the electrical, mechanical, environmental, agency and reliability requirements for three phase, adjustable frequency drives as specified herein and as shown on the contract drawings.

2.12 REFERENCES

A. The adjustable frequency drives and all components shall be designed, manufactured and tested in accordance with the latest applicable standards.

1. Institute of Electrical and Electronic Engineers (IEEE)
    a. IEEE 519-1992: Guide for harmonic content and control

2. Underwriters Laboratories (UL508C: Power Conversion Equipment)
    a. UL
    b. cUL

3. National Electrical Manufacturer's Association (NEMA)
    a. ICS 7.0: Industrial Controls & Systems for AFDs.

4. IEC 61800-2 and –3. EN 50082-1 and -2
    a. Fulfill all EMC immunity requirements

B. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2.13 SUBMITTALS

2.13.1 SUBMITTAL FOR REVIEW / APPROVAL

A. The following information shall be submitted to the Engineer.

1. Dimensioned outline drawing.

2. Control Schematic diagram.

3. Power and control connection diagram(s)

B. Submit four (4) copies of the above information.

2.13.2 SUBMITTAL FOR INFORMATION

A. When requested by the Engineer the following product information shall be submitted:

1. Product bulletins

2. Technical product data sheets

3. Harmonic analysis result

2.13.3 SUBMITTAL FOR CLOSE-OUT

A. The following information shall be submitted for record purposes prior to final payment.

1. Final as-built drawings and information for items listed section in 1.04.1.

2. Installation information.

2.14 QUALIFICATIONS

A. The supplier of the assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors, power distribution circuit breakers, when specified. These parts, when specified, shall have a commonality with other manufacturer's products.

B. For the equipment specified herein, the manufacturer shall be ISO 9002 certified.

C. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. Adjustable Frequency Drives shall be on the basis of Danfoss FC1000 for function and quality.

2.15 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

2.16 FIELD MEASUREMENTS

2.17 OPERATION AND MAINTENANCE MANUALS

A. Five (5) copies of the equipment operation and maintenance manuals shall be provided.

B. Operation and maintenance manuals shall include the following information:

1. Instruction books

2. Recommended renewal parts list.

3. Drawings and information required by section 1.04.3

PART 3: PRODUCTS

3.1 ADJUSTABLE FREQUENCY DRIVES (AFD)

A. Where shown on the drawings, adjustable frequency drives 1 through 250 HP shall have the following features:

1. The AFDs shall be rated for 480 Vac (optional input voltages of 208, 240 Vac through 100 HP). The AFD shall provide microprocessor based control for three-phase induction motors. The controller's full load output current rating shall be based on variable torque application at 40° C ambient and 1-16 kHz switching frequency below 50 HP and 1-10 kHz 50 HP and above to reduce motor noise and avoid increased motor losses.

2. The AFDs shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via

a two-step operation. Adjustable Current Source AFDs are not accepted. Insulated Gate Bipolar Transistors (IGBTs) shall be used in the inverter section. Bipolar Junction Transistors, GTOs or SCRs are not accepted. The AFD shall run at the above listed switching frequencies.

3. The AFDs shall have efficiency at full load and speed that exceeds 95% for AFDs below 15 HP and 97% for drives 15 HP and above. The efficiency shall exceed 90% at 50% speed and load.

4. The AFDs shall maintain a minimum line side displacement power factor of 0.96, regardless of speed and load.

5. The AFDs shall have a one (1) minute overload current rating of 110% for variable torque applications.

6. The AFDs shall be capable of operating any NEMA design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the AFD.

7. The AFDs shall have an integral EMI/RFI filter as standard.

8. The AFDs shall limit harmonic distortion reflected onto the utility system to voltage and current levels as defined by IEEE 519-1992 for general systems applications, by utilizing the standard 3% nominal impedance integral ac three-phase line reactor. DC link chokes are not accepted.

9. Any harmonic calculations shall be done based on the kVA capacity, X/R ratio and the impedance of the utility transformer feeding the installation, as noted on the drawings, and the total system load. The calculations shall be made with the point of common coupling (PCC) being the point where the utility feeds multiple customers.

10. The system containing the AFDs shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as defined in IEEE 519-1992. If the system cannot meet the harmonic levels with the AFDs provided with the standard input line reactor or optional input isolation transformer, the AFD manufacturer shall supply an eighteen pulse, multiple bridge rectifier ac to dc conversion section with phase shifting transformer for all drives above 75 HP. This eighteen pulse rectifier converter shall result in a multiple pulse current waveform that will more nearly approximate a true sine wave to reduce voltage harmonic content on the utility line. The phase shifting transformer shall be of a single winding type to optimize its KVA rating and harmonic cancellation capability.

    Harmonic filters are not accepted above 75 HP.

11. The AFDs shall be able to start into a spinning motor. The AFDs shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the AFDs shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.

Standard operating conditions shall be:[1]

A. Incoming Power: Three-phase, 208 / 240 / 480 (+10% to -15%) and 50/60 Hz (+/-5 Hz) power to a fixed potential DC bus level.

B. Frequency stability of +/-0.05% for 24 hours with voltage regulation of +/-1% of maximum rated output voltage.

C. Speed regulation of +/- 0.5% of base speed.

D. Load inertia dependant carryover (ride through) during utility loss.

E. Insensitive to input line rotation.

F. Humidity: 0 to 95% (non-condensing and non-corrosive).

G. Altitude: 0 to 3,300 feet (1000 meters) above sea level.

H. Ambient Temperature: -10 to 40 °C (VT).

I. Storage Temperature: -40 to 70 °C.

13. Control Functions

A. Frequently accessed AFD programmable parameters shall be adjustable from a digital operator keypad located on the front of the AFD. The AFDs shall have a 3 line alphanumeric programmable display with status indicators. Keypads must use plain English words for parameters, status, and diagnostic messages. Keypads that are difficult to read or understand are not accepted, and particularly those that use alphanumeric code and tables. Keypads shall be adjustable for contrast with large characters easily visible in normal ambient light.

B. The keypad shall include a Hand-Off-Auto membrane selection and an Inverter/Bypass membrane selection. When in “Hand” the AFD will be started and the speed will be controlled from the up/down arrows. When in “Off”, the AFD will be stopped. In “Auto”, the AFD will start via an external contact closure or a communication network and the AFD speed will be controlled via an external speed reference.

C. The keypad shall have copy / paste capability.

D. Upon initial power up of the AFD, the keypad shall display a start up guide that will sequence all the necessary parameter adjustments for general start up.

E. Standard advanced programming and trouble-shooting functions shall be available by using a personal computer’s RS-232 port and Windows™ based software. In addition the software shall

permit control and monitoring via the AFD's RS232 port. The manufacturer shall supply a diskette with the required software. An easily understood instruction manual and software help screens shall also be provided. The computer software shall be used for modifying the drive setup and reviewing diagnostic and trend information as outlined in this section through section 18.

F. The operator shall be able to scroll through the keypad menu to choose between the following:

1. Parameter Menu
2. Keypad Control
3. System Menu
4. Expander Boards
5. Monitoring Menu
6. Operate Menu

G. The following setups and adjustments, at a minimum, are to be available:

1. Start command from keypad, remote or communications port
2. Speed command from keypad, remote or communications port
3. Motor direction selection
4. Maximum and minimum speed limits
5. Acceleration and deceleration times, two settable ranges
6. Critical (skip) frequency avoidance
7. Torque limit
8. Multiple attempt restart function
9. Multiple preset speeds adjustment
10. Catch a spinning motor start or normal start selection
11. Programmable analog output

14. The AFD shall have the following system interfaces:

A. Inputs – A minimum of six (6) programmable digital inputs, two (2) analog inputs and serial communications interface shall be provided with the following available as a minimum:

1. Remote manual/auto
2. Remote start/stop
3. Remote forward/reverse
4. Remote preset speeds
5. Remote external trip
6. Remote fault reset
7. Process control speed reference interface, 4-20mAdc
8. Potentiometer or process control speed reference interface, 0 -10Vdc
9. RS232 programming and operation interface port

B. Outputs – A minimum of two (2) discrete programmable digital outputs, one (1) programmable open collector output, and one

(1) programmable analog output shall be provided, with the following available at minimum.

1. Programmable relay outputs with one (1) set of Form C contacts for each, selectable with the following available at minimum:

    a. Fault
    b. Run
    c. Ready
    d. Reversing
    e. Jogging
    f. At speed
    g. In torque limit
    h. Motor rotation direction opposite of commanded
    i. Over temperature

2. Programmable open collector output with available 24Vdc power supply and selectable with the following available at minimum:

    a. Fault
    b. Run
    c. Ready
    d. Reversing
    e. Jogging
    f. At speed
    g. In torque limit
    h. Motor rotation direction opposite of commanded
    i. Over temperature

3. Programmable analog output signal, selectable with the following available at minimum:

    a. Output frequency
    b. Frequency reference
    c. Motor speed
    d. Output current
    e. Motor torque
    f. Motor power
    g. Motor voltage
    h. DC link voltage
    i. PID controller reference value
    j. PID controller actual value 1
    k. PID controller actual value 2
    l. PID controller error value
    m. PID controller output

C. Capability of two additional expandable I/O interface cards. Upon installation, software shall automatically identify the interface card and activate the appropriate parameters. This should be done without adding any new software.

15. Monitoring and Displays

A. The AFD's display shall be a LCD type capable of displaying three (3) lines of text and the following thirteen (13) status indicators:

1. Run
2. Forward
3. Reverse
4. Stop
5. Ready
6. Alarm
7. Fault
8. I/O Terminal
9. Keypad
10. Bus/comm
11. Hand
12. Auto
13. Off

B. The AFD's keypad shall be capable of displaying the following monitoring functions at a minimum:

1. Motor Speed (RPM and %)
2. Frequency reference
3. Output frequency
4. Motor current
5. Motor torque
6. Motor power
7. Motor voltage
8. DC-link voltage
9. Heat sink temperature
10. Motor run time (resetable)
11. Total operating days counter
12. Operating hours (resetable)
13. Total megawatt hours
14. Megawatt hours (resetable)
15. Voltage level of analog input
16. Current level of analog input
17. Digital inputs status
18. Digital and relay outputs status
19. Motor temperature rise
20. PID references

16. Protective Functions

A. The AFD shall include the following protective features at minimum:

1. Over current
2. Over voltage
3. System fault
4. Under voltage
5. Input line supervision

6. Output phase supervision
7. Under temperature
8. Over temperature
9. Motor stalled
10. Motor over temperature
11. Motor under load
12. Logic voltage failure
13. Microprocessor failure
14. Brake chopper supervision
15. DC Injection braking

B. The AFD shall provide ground fault protection during power-up, starting, and running. AFD's with no ground fault protection during running are not accepted.

17. Diagnostic Features

A. Active Faults

1. The last 10 faults shall be recorded and stored in sequential order
2. Fault code and description of fault shall be displayed on the keypad.
3. Fault or alarm LED shall blink
4. Display drive data at time of fault
5. In the event several faults occur simultaneously, the sequence of active faults shall be viewable.
6. During a fault, the drive must be able to identify the following:
   - Drive Speed
   - Running hours
   - Running Days
   - Amps during fault
   - Motor Power
   - Motor Torque
   - DC bus Voltage
   - Drive Temperature

B. Fault History

1. The last 30 faults shall be recorded and stored in sequential order.
2. Display drive data at time of fault

18. Additional features included in the AFDs:

A. The following indicating lights shall be provided on the keypad. .

1. Drive Ready
2. Drive Run
3. Drive Fault

B. The current withstand rating of the drive shall be 100,000 AIC. .

C. Communication card for interface with Johnson Controls Metasys control system.

D. The AFD shall have a cooling fan that is field replaceable using non-screw accessibility.

19. Enclosure

A. The AFD shall be designed in a NEMA Type 12 enclosure.

B. The AFD shall have complete front accessibility with easily removable assemblies.

C. Cable entry shall be bottom entry.

20. The AFD manufacturer shall maintain, as part of a national network, engineering service facilities within 250 miles of project to provide start-up service, emergency service calls, repair work, service contracts, maintenance and training of customer personnel.

PART 4: EXECUTION

4.1 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.

2. All final assemblies shall be tested at full load with application of line-to-line and line-to-ground bolted faults. The Adjustable Frequency Drive shall trip electronically without device failure.

3. After all tests have been performed; each AFD shall undergo a burn-in test. The drive shall be burned in at 100% inductive or motor load without an unscheduled shutdown.

4. After the burn-in cycle is complete, each AFD shall be put through a motor load test before inspection and shipping.

B. All testing and manufacturing procedures shall be ISO 9001 certified.

4.2 FIELD QUALITY CONTROL

A. Provide the services of a qualified manufacturer's employed Field Service Engineer or authorized service representative to assist the Contractor in installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of AFD's on the job site. Sales representatives will not be accepted to perform this work. The manufacturer's service representative shall provide technical direction and assistance to

the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependant adjustments, and verification of proper AFD operation.

B. The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer's service representative.

1. Inspection and final adjustments.
2. Operational and functional checks of AFDs and spare parts.

3. The contractor shall certify that he has read the drive manufacturer's installation instructions and has installed the AFD in accordance with those instructions.

4.3 MAINTNANCE / WARRANTY SERVICE

A. Standard warranty is twenty-four (24) months from the date of shipment and covers the factory repair or replacement of the defective unit.

4.4 LOCAL CONTROL PANELS

A. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.

B. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.

C. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.

D. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.

E. All wiring shall be neatly installed in plastic trays or tie-wrapped.

F. A convenience 120 VAC duplex receptacle shall be provided in each enclosure, fused on/off power switch, and required transformers.

4.5 POWER SUPPLIES

A. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.

B. Input: 120 VAC +10%, 60Hz.

C. Output: 24 VDC.

D. Line Regulation: +0.05% for 10% line change.

E. Load Regulation: +0.05% for 50% load change.

F. Ripple and Noise: 1 mV rms, 5 mV peak to peak.

G. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.

H. A power disconnect switch shall be provided next to the power supply.

F. Thermostats

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

PART 5 – PERFORMANCE / EXECUTION

5.1 BMS SPECIFIC REQUIREMENTS

A. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection. .

B. Custom Reports:

1. Provide custom reports as required for this project:

C. Actuation / Control Type

1. Primary Equipment
   a. Controls shall be provided by equipment manufacturer as specified herein.
   b. All damper and valve actuation shall be electric.
2. Air Handling Equipment
   a. All air handers shall be controlled with a HVAC-DDC Controller
   b. All damper and valve actuation shall be electric.

5.2 INSTALLATION PRACTICES

A. BMS Wiring

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Management System, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
2. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.
3. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
4. Class 2 Wiring

a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.

5. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.

6. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

B. BMS Line Voltage Power Source

1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 16.

2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.

3. DDC terminal unit controllers may use AC power from motor power circuits.

C. BMS Raceway

1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 1/2".

2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.

3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.

4. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

D. Penetrations

1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.

2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.

3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.

4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

.BMS Identification Standards

5. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.

   Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

E. BMS Panel Installation

1. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
2. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.

F. Input Devices

1. All Input devices shall be installed per the manufacturer recommendation
2. Locate components of the BMS in accessible local control panels wherever possible.

G. HVAC Input Devices – Genera1

1. All Input devices shall be installed per the manufacturer recommendation
2. Locate components of the BMS in accessible local control panels wherever possible.
3. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
4. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
5. Outside Air Sensors
   a. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
   b. Sensors shall be installed with a rain proof, perforated cover.
6. Water Differential Pressure Sensors
   a. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
   b. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
   c. The transmitters shall be installed in an accessible location wherever possible.
7. Medium to High Differential Water Pressure Applications (Over 21" w.c.):
   a. Air bleed units, bypass valves and compression fittings shall be provided.
8. Building Differential Air Pressure Applications (-1" to +1" w.c.):
   a. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
   b. The interior tip shall be inconspicuous and located as shown on the drawings.
9. Duct Temperature Sensors:

a. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
b. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
c. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
d. The sensor shall be mounted to suitable supports using factory approved element holders.

10. Space Sensors:
    a. Shall be mounted per ADA requirements.
    b. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
11. Low Temperature Limit Switches:
    a. Install on the discharge side of the first water or steam coil in the air stream.
    b. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.
    c. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.

H. HVAC Output Devices

1. All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
2. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.
3. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
4. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.
5. Electronic Signal Isolation Transducers: Whenever an analog output signal from the Building Management System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems

5.2 TRAINING

A. The BMS contractor shall provide the following training services:

1. One day of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

5.3 COMMISSIONING

A. Fully commission all aspects of the Building Management System work.

B. Acceptance Check Sheet

1. Prepare a check sheet that includes all points for all functions of the BMS as indicated on the point list included in this specification.
2. Submit the check sheet to the Engineer for approval
3. The Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.

C. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

END OF SECTION

SECTION 23 09 10 – VARIABLE FREQUENCY DRIVES

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the variable frequency drives.

B. Description of Work

C. Standards

D. Quality Assurance

1. Acceptable Manufacturers: Square D., Graham, & Hitachi.

E. Submittals

F. Product Delivery, Storage, and Handling

1.2 PRODUCTS

A. Electronic Variable Frequency Drives

1. Provide electronic variable frequency drives for control of standard or high-efficiency NEMA Design B induction motors as required for equipment.

1.3 EXECUTION

A. Installation of Electronic Variable Frequency Drives

1. Provide all electronic variable frequency drives with galvanized angle or other suitable supports where mounting on wall or other rigid surface is impractical.
2. Coordination

B. Start-up/Testing

C. Training

D. Identification

END OF SECTION

SECTION 23 21 13 – HVAC PIPING

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the HVAC piping systems.

B. Description of Work

C. Quality Assurance

1. Qualify welding procedures, welders, and operators in accordance with ANSI B31.1, Paragraph 127.5, for shop and job site welding of piping work.

1.2 PRODUCTS

A. Piping Materials

B. Pipe/Tube Fittings

1.3 EXECUTION

A. Piping Installation

1. General
2. Steel Pipe
3. Copper Pipe
4. Final Connections to Equipment Furnished by Owner
5. Excavation, Installation, and Backfill for Underground Pipe

B. Chilled Water & Heating Water Piping

1. Piping

a. Above ground piping 5” and larger: Black steel, ASTM A53, Schedule 40; 4” and smaller: Copper type “L”.

b. Underground piping 5” and larger: 5” and larger: Black steel, ASTM A53, Schedule 40; 4” and smaller: Copper type “L”.

2. Fittings
3. Cold-springing
4. Automatic Air Vents

C. Condensate Drainage

1. Provide a condensate drain pipe to connect each cooling unit drain pan or funnel and to extend to and discharge into an open type drain in the sanitary plumbing system.

D. Chemical Treatment Piping for Open and Closed Loops System

E. Cleaning, Flushing, Testing, and Inspecting

END OF SECTION

SECTION 23 21 14 – VALVES

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the valves associated with the piping systems.

B. Description of Work

C. Quality Assurance

1. Acceptable Manufacturers

a. General Valves: Jenkins Bros. Valves, Crane Company, Stockham Valves and Fittings, Walworth Company, Kennedy Valve, Kitz, Nibco, or approved equal

b. Ball Valves: Jenkins Bros. Valves, Jamesbury Corporation, Nibco, Stockham Valves and Fittings, Apollo, Kitz, approved equal.

c. Backflow Preventers: Watts Regulator Company, Febco, Hersey Products, Inc., Wilkins, or approved equal.

d. Refrigerant Valves: Mueller Brass Company, Henry Valve Company, Superior Valve Company, approved equal.

e. Check Valves: Jenkins Bros. Valves, Crane Company, Muesco, Inc., APCO/Valve & Primer Corporation, Williams-Hager, Clow Pipeline Products, Valve Division, Nibco, Crane, Stockham, Milwaukee, Kitz, or approved equal.

f. Butterfly Valves: Jenkins Bros. Valves, Jamesbury Corporation, Nibco, Stockham Valves and Fittings, Apollo, Keystone, Demco, Grinnell, Centerline, Kitz, or approved equal.

1.2 PRODUCTS

A. Materials

1. General
2. Refrigerant Valves
3. Butterfly Valves
4. Ball Valves
5. Gate Valves

B. Valves

1. Valves for service at or less than 150 psig.
2. Valves for service over 150 psig.
3. Check valves.
4. Valves for Water Make Up connections.
5. Relief Valve
6. Combination Pressure Reducing and Relief Valve for Make Up Water

7. Reduced Pressure Backflow Preventer
8. Domestic Water Pressure Reducing Valves
9. Valves for Gas Connections

C. Fire Protection Valves

1. Check Valves
2. OS&Y Valves

1.3 Execution

A. Installation

1. Ball Valves
2. Valve Stems
3. Chain Operators
4. Swing Check Valves
5. Unions and Companion Flanges
6. Access Doors and Panels

END OF SECTION

SECTION 23 21 15 - HVAC BELOW GRADE AND EXPOSED SITE PIPING

1.0 GENERAL

1.1 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the HVAC below grade site piping systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the HVAC site piping systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide complete operating mechanical piping systems including pipe, tube, fittings, and appurtenances as indicated and in compliance with these Specifications.

B. Applications: Applications of piping systems include, but are not limited to, the systems as listed below:

System	Working Pressure	Operating Temperatures
Chilled Water		
High	350 psig	65 to 100°F
Medium	300 psig	65 to 100°F
Low	150 psig	65 to 100°F
Heating Water		
High	350 psig	100 to 180°F
Medium	300 psig	100 to 180°F
Low	150 psig	100 to 180°F

1.3 QUALITY ASSURANCE

A. Welding: Qualify welding procedures, welders, and operators in accordance with ANSI B31.1, Paragraph 127.5, for shop and job site welding of piping work. Make welded joints on the piping system with continuous welds, without backing rings and with pipe ends beveled before welding. Gas cuts shall be true and free from burned metal. Before welding, surfaces shall be thoroughly cleaned. The piping shall be carefully aligned and no weld metal shall project inside the pipe.

2.0 PRODUCTS

2.1 PIPING MATERIALS

A. General: Provide pipe and tube of type, joint, grade, size, and weight (wall thickness, schedule or class) indicated for each service. Comply with applicable governing regulations and industry standards.

1. Ductile Iron: ANSI/AWWA C151/A21.51-02 with mechanical joints and internal cement liner

2. Steel Pipe: ASTM A53, ASTM A106, or ASTM A120, black or hot-dipped galvanized as specified.

2.2 PIPING / TUBING FITTINGS

A. General: Provide factory-fabricated fittings of type, materials, grade, class, and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve, and equipment connections. Where not otherwise indicated, comply with governing regulations, industry standards, and where applicable, with pipe manufacturer's instructions for selections.

1. Ductile Iron: AWWA C110 & AWWA C111mechanical joint fittings with gaskets

2. Wrought Steel Butt-welding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns; rated to match connected pipe.

B. Miscellaneous Piping Materials/Products:

1. Welding Materials: Comply with ASME Boiler and Pressure Vessels Code, Section II, Part C, for welding materials.

2. Brazing Materials: American Welding Society, AWS A5.B, Classification BCup-5.

3. Gaskets for Flanged Joints: 1/8" thick gaskets. Ring-type shall be used between raised face flanges and full face-type between flat face flanges with punched bolt holes and pipe opening. Gaskets shall be Garlock Style 3400 compressed non-asbestos or equal.

2.3 BELOW GRADE AND EXPOSED PRE-INSULATED PIPE CONDUIT SYSTEM

A. General: Furnish a complete system of factory fabricated piping and fittings for the specified service.

B. Manufacturers: Basis of design is Energy Task Force. Other acceptable manufacturers include Thermacor, Insul-Tek, Perma-Pipe and Rovanco.

C. Service & Piping Materials:

1. Below Grade Chilled Water Piping – Class 350 cement lined Ductile Iron

2. Below Grade Heating Water Piping – Schedule 40 Steel

D. Insulation: polyurethane foam or injected into the annular space between carrier pipe and jacket and bonded to both. Insulation shall be rigid, closed cell polyurethane with 2.0 to

3.0 pounds per cubic foot density and coefficient of thermal conductivity (K-Factor) not to exceed 0.16 and shall conform to ASTM C-591.

E. Jacketing: High impact seamless polyvinyl chloride(PVC) class 12454B compound conforming to ASTM 1784, Type 1, Grade 1 for pipe sizes 12" and smaller. High density polyethylene(HDPE) casing Type III, category 5, class C, conforming to ASTM D-1248 for pipe sizes 14" and larger.

F. End Seals: Provide high temperature black mastic end seal on each end of each length of pre-insulated pipe. Provide extra mastic end seal material during installation for field cut pipe. At no time during installation should insulation be directly exposed to elements.

G. Provide all necessary expansion loops, expansion elbows, anchors, wall sleeves and all necessary accessories for field assembly and insulation of fittings and straight joints.

H. Any piping that is exposed above grade provide integral electrically heated heat trace freeze protection.

I. Any exposed piping exposed to sunlight shall have UV coating.

2.4 ISOLATION VALVES

A. General: Furnish all valves located below grade with valve box and appropriate access.

B. Provide gate valves for each new branch line to isolate the new branch line from the utility main.

C. Gate Valve:

1. Conform to AWWA Standard C515
2. Resilient wedge gate valve with non-rising stem and 2 inch square operating nut
3. Valve shall be iron body epoxy-coated interior and exterior surfaces. Epoxy shall be in conformance with AWWA C550 and be NSF 61 Certified
4. Stem shall be bronze with integral collars. Stem shall have two O-rings above collar and one O-ring below collar
5. Manufacturer: Basis of design is M&H Series 700, approved equal by Clow, Kennedy or Mueller

3.0 EXECUTION

3.1 PIPING INSTALLATION

A. General:

1. Industry Practices: Install pipe, tube, and fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without failure or degradation of service. Install each run with a minimum of joints and couplings, but with adequate and accessible unions or flanged connections to permit disassembly for maintenance/ replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align accurately at connections.

Coordinate piping locations with other trades to avoid conflict. Give ductwork preference unless directed otherwise by the Engineer.

2. Systems: Provide fittings at changes in direction. Where pipes of different sizes join, provide reducing elbows, tees, or couplings. Bushings will not be acceptable.

3. Expansion and Contraction: Install loops, offsets, sizing joints, and expansion joints, as necessary, to avoid strain resulting from expansion and contraction of piping systems on fixtures and equipment. Provide mechanical grooved connections required by the application to reduce vibration at equipment connections. Provide expansion joints in piping systems by mechanical grooved connections where required.

B. Steel Pipe: Ream steel pipe after cutting and before threading. Thread with clean-cut taper threads of length to engage all threads in fittings and leave no full-cut threads exposed after make-up.

C. Excavation, Installation, and Backfill for Underground Pipe:

1. Layout: Pipes shall be laid and pipe joints made in presence of the General Contractor and field measurements, layouts, batter board alignment, grade establishments, and similar locations shall be performed by a Professional Engineer in the employ of the Contractor. The Contractor's engineer shall be on the job during all underground work. A "Bench-Mark" reference shall be provided by the General Contractor.

2. Pipe Grading: Lay and maintain all pipes at required lines and grades during the course of the Work.

3. Trench: Excavate the trench to the depth required. Properly brace and de-water the trench and keep it free of water during installation, testing pipe, and backfilling. No water shall be discharged onto the street or freeway without approval by the Owner.

4. Excavation: The trench shall be at least 18" wider than the maximum diameter of the pipe or largest bell and the pipe shall be laid in the center of the trench. The trench shall be excavated to a depth sufficient to provide for pipe cushions or supports as specified. Trench width may be increased as required and piling left in place until sufficient compacted backfill is in place. Properly sheet and brace all open trenches to render them secure and remove all such sheeting and bracing before completing the backfill. Comply with all applicable national, state, and local codes and regulations. The quantity of excavation required to install sheeting and the installation and removal of sheetings and bracings will not be regarded as Extra Work. All costs incurred for this excavation and the installation of sheeting shall be included in the Contract Price.

5. Grading: Upon completion of excavation and prior to the laying of the pipe, the trench bottom shall be brought up to the required elevation with a pipe cushion, except where the cushion has been eliminated by the General Contractor. Pipe cushions shall be select material deposited in the trench and shall be compacted,

leveled off, and shaped to obtain a smooth compacted bed along the laying length of the pipe. Pipe cushion material shall be as follows:

6. Anchors: Pipes shall have concrete anchors at each change in direction and/or as directed. Any change in direction exceeding 15 degrees shall be anchored. Concrete anchors shall rest against solid (virgin) ground with the required area of bearing on pipe and ground to provide suitable anchoring.

7. Backfill: Backfill trenches only after piping has been inspected, tested, and approved by the General Contractor. Backfill shall be provided as recommended in the geo-technical report included in these Contract Documents, or, in the absence of a geo-technical report, as required by site conditions. Refer to Division 2 or elsewhere in the Contract Documents for additional trenching and backfill requirements.

8. Existing Surfaces: Restore existing streets, driveways, and sidewalks damaged during the excavation work to acceptable condition, subject to approval by the Owner, Architect, and/or Engineer.

9. Safety: Provide street and sidewalk excavations with approved barricades, warning lights, and cover plates as required by the local authorities.

3.2 CLEANING, FLUSHING, TESTING, AND INSPECTING

A. Cleaning & Flushing: The mechanical contractor shall adhere to Auburn University Water Treatment procedures as laid out in Appendex J of the Auburn University Design and Construction Standards and as follows:

1. It is to be performed in conjunction with and under the technical direction of the Utilities & Energy Water Treatment department.
2. General Guidelines– Closed Loop Treatment
    a. Submittals - Provide product data for all chemical treatment materials, chemicals and equipment. Product data shall include chemical explanation, MSDS, layouts of feeding equipment and equipment detail sheets.
    b. Quality Assurance
        i. Retain the resources of the chemical water treatment contractor who is already under contract with the client or has been prequalified by the client.
        ii. The water treatment chemical and service supplier shall be a recognized specialist, active in the field of industrial water treatment for at least five years, whose major business is in the field of water treatment, and who has full time service personnel within the area of the job site. Laboratory facilities shall be available. Service personnel shall be degreed specialists in the fields of mechanical or chemical engineering or chemistry.
        iii. Furnish and install all equipment and material on this project in accordance with the requirements of the authority having jurisdiction, suitable for its intended use on this project, approved by the U.S. Environmental Protection Agency (EPA), and local Department of Environmental Protection, and so certified by the manufacturer.

iv. If not already known, analyze the water from the local water supplier to be used on the project, before establishing treatment procedures.
v. The cleaning sequence will not be deemed completed until fully signed off and agreed upon by the Auburn University Water Treatment Department, as well as, the Plant Operations Group.

c. Safety
- All chemical and analytical reagents supplied by the vendor shall meet all applicable government regulations. The bidders shall submit an MSDS for all proposed products with the initial technical proposal. The vendor shall be responsible for providing up to date MSDS for all chemicals supplied including reagents.

ii. The mechanical contractor shall be responsible for the safe cleanup of any chemical spills relating to products supplied by the vendor and caused by failure or malfunction of the chemical feed equipment or due to the actions of the field service personnel. Cleanup shall be performed in accordance with all current government regulations and good safety practices. Vendor shall maintain a 24 hour hot line for emergency situations. Bidder shall provide the phone number and procedure to access the hot line including estimated response time in the event of an emergency.

d. Technical Services
i. Mechanical contractor shall be responsible for handling of all water treatment chemicals.
ii. All chemical deliveries shall be made to the point of use by the vendor or an ahead of time agreed up on location such as the mechanical contractors lay down yard. The contractor shall remove, following local, state and federal governances all chemical containment systems as instructed by the vendor.

e. Underground Laterals - Chilled Water/Ductile Lined
i. Materials
- Pump Strainer shall be fine mesh (3/64-inch maximum).
- Sterilization Chemicals shall be non-oxidizing biocide which has halogen like effects such as 2,2-dibromo-3-nitrilopropionamide, also known as DBNPA.
- Use GE Betz Spectrus NX108 or equivalent.
- Water Treatment Chemical shall be GE Betz Corrshield MD407 or equivalent.

ii. Preparation
- Contractor shall provide a minimum notice of fourteen (14) days to the water treatment vendor to allow for delivery of chemicals.
- Contractor will notify the University Project Lead three (3) working days prior to filling for pressure testing and cleaning of new water pipes. The new piping system shall not be connected/operated until the chemical clean-up is performed.
- Contractor shall determine supply and return diameters. If the supply and return lines are less than six inches (6”) they do not require sterilization, however, they do require flushing with system chilled water before they are put into service.
- Contractor shall install a two (2”) inch bypass inside the mechanical room before the building isolation valves to aid in cleaning, flushing and treatment of the laterals.

iii. Sterilization/Flushing Sequence

- If filling of the pipe is to occur as the pipe sections are constructed, then sterilization shall be accomplished as the pipe is constructed, otherwise, sterilization can be done at the end of each job as long as no water is put into the pipe for any reason. Once a section of pipe between isolation valves is complete, the piping shall be hydro tested, sterilized and treated, in that order. Under no circumstance shall the pipe remain untreated for more than one week after initial filling.
- All water shall be metered into the pipe and amounts shall be tabulated and given to University Project Lead to indicate the volume of water in each pipe section between isolation valves. Pipe quantities and sizes shall also be tabulated to verify piping is filled completely.
- Two twelve (12) ounce bottles of the system water shall be taken for laboratory analysis prior to the start of the addition of biocide for sterilization or flushing. University Project Lead will be responsible for providing the sample bottles to the mechanical contractor.
- Biocide shall be added to pipe at a concentration of 50 ppm based on total water volume in the pipe.
- Place the re-circulation pump at the low point of the area to be cleaned so that adequate venting can occur at the high point of the system.
- At the high point crossover, contractor to provide a ball valve and sample point for ease of water testing and for venting air from the system.
- Circulate the solution for at least twenty four (24) hours or as recommended by the University Project Lead, whichever is less. Balance valves shall be included to ensure pump is operated with sufficient head. Valve shall be manually modulated to obtain proper flow from pump. Pump differential head and certified pump curves shall be utilized to determine pump flow. Biocide shall be circulated to maintain a minimum pipe flow as shown in the following table. Flow rate shall be determined based on the largest diameter piping in the system.
- **MINIMUM CLEANING WATER**

Pipe Size (in)	*Flow (gpm)*
2	45
4	100
6	250
10	500
14	960
15 thru 30	1,250

- Following cleaning, drain systems as quickly as possible. Flush with clean water until the University Project Lead or the chemical vendor verifies the water is back to city water quality.
- Remove strainer(s).
- Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required. Under no circumstance shall cross overs or ball valves be left underground. Where crossovers and valves are used, they must be removed, plugged, sealed and adequately insulated prior to burial.

iv. Water Treatment
- Within 48 hours following the completion of the cleaning sequence, the water treatment chemicals shall be added and circulated as recommended by the University Project Lead.
- Two additional twelve (12) ounce bottles shall be gathered for laboratory analysis once treated water is in the pipe.

v. Flushing Sequence for Lines Less than 6" in Diameter
- If filling of the pipe is to occur as the pipe sections are constructed, then sterilization shall be accomplished as the pipe is constructed, otherwise, sterilization can be done at the end of each job as long as no water is put into the pipe for any reason. Once a section of pipe between isolation valves is complete, the piping shall be hydro tested, sterilized and treated, in that order. Under no circumstance shall the pipe remain untreated for more than one week after initial filling.
- All water shall be metered into the pipe and amounts shall be tabulated and given to University Project Lead to indicate the volume of water in each pipe section between isolation valves. Pipe quantities and sizes shall also be tabulated to verify piping is filled completely.

vi. Two twelve (12) ounce bottles of the system water shall be taken for laboratory analysis prior to the start flushing process. University Project Lead will be responsible for providing the sample bottles to the mechanical contractor.

vii. System water is to be introduced to the new pipe and allowed to fill the lines and flush until it runs clear at the bypass outlined in Section 2.2, Paragraph B, Subparagraph 4 above, in the mechanical room risers of the new or retrofitted building.

viii. Two additional twelve (12) ounce bottles shall be gathered for laboratory analysis once treated water is in the pipe.

ix. Under no circumstance shall cross overs or ball valves be left underground. Where crossovers and valves are used, they must be removed, plugged, sealed and adequately insulated prior to burial, except in the case where the University Project Lead deems it necessary for underground main protection; mainly in the case of extended lay-up periods.

f. Underground Laterals – Hot Water

i. Materials
- Pump Strainer shall be fine mesh (3/64-inch maximum).
- Cleaning and Sterilization Chemicals shall be liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products. Use GE Betz Ferroquest FQ7101 or equivalent.
- Water Treatment Chemical shall be GE Betz Corrshield NT402 or equivalent.

ii. Preparation
- Contractor shall provide a minimum notice of fourteen (14) days to the water treatment vendor to allow for delivery of chemicals.
- Contractor will notify the University Project Lead three (3) working days prior to filling and cleaning of new water pipes.

The new piping system shall not be connected/operated until the chemical clean-up is performed.

- Contractor shall determine supply and return diameters. If the supply and return lines are less than six inches (6") they do not require cleaning, however, they do require flushing with system hot water before they are put into service.
- Contractor shall install a two (2") inch bypass inside the mechanical room before the building isolation valves to aid in cleaning, flushing and treatment of the laterals.

iii. Cleaning/Flushing Sequence

- If filling of the pipe is to occur as the pipe sections are constructed, then sterilization shall be accomplished as the pipe is constructed, otherwise, sterilization can be done at the end of each job as long as no water is put into the pipe for any reason. Once a section of pipe between isolation valves is complete, the piping shall be hydro tested, sterilized and treated, in that order. Under no circumstance shall the pipe remain untreated for more than one week after initial filling.
- All water shall be metered into the pipe and amounts shall be tabulated and given to University Project Lead to indicate the volume of water in each pipe section between isolation valves. Pipe quantities and sizes shall also be tabulated to verify piping is filled completely.
- Two twelve (12) ounce bottles of the system water shall be taken for laboratory analysis prior to the start of the addition of cleaning chemical or flushing. University Project Lead will be responsible for providing the sample bottles to the mechanical contractor.
- System cleaner shall be added to the piping section at a concentration as recommended by University Project Lead following the hydro test. A water volume equal to the calculated amount of cleaner to be added shall be drained from the pipe to allow for addition of cleaner.
- Place the re-circulation pump at the low point of the area to be cleaned so that adequate venting can occur at the high point of the system.
- At the high point crossover, contractor to provide a ball valve and sample point for ease of water testing and for venting air from the system.
- Circulate the solution for at least twenty four (24) hours or Less if recommended by University Project Lead. Balance valves shall be included to ensure pump is operated with sufficient head. Valve shall be manually modulated to obtain proper flow from pump. Pump differential head and certified pump curves shall be utilized to determine pump flow. Cleaner shall be circulated to maintain a minimum pipe flow as shown in the following table. Flow rate shall be determined based on the largest diameter piping in the system.
- **MINIMUM CLEANING WATER**

  Pipe Size (in) Flow (gpm)

  a.

2	45
4	100
6	250
10	500
14	960
15 thru 30	1,250

- Twenty four (24) hours following the start of the cleaning process, two twelve (12) ounce bottles of system water shall be gathered for laboratory analysis. Following cleaning, drain systems as quickly as possible.
- Flush with clean water until the University Project Lead or the chemical vendor verifies the water is back to city water quality.
- Two twelve (12) ounce bottles of system water shall be gathered for laboratory analysis following city water flushing.
- Remove strainer(s).
- Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required. Under no circumstance shall cross overs or ball valves be left underground. Where crossovers and valves are used, they must be removed, plugged, sealed and adequately insulated prior to burial.

iv. Water Treatment
- Within 48 hours following the completion of the cleaning sequence, the water treatment chemicals shall be added and circulated as recommended by the University Project Lead.
- Two additional twelve (12) ounce bottles shall be gathered for laboratory analysis once treated water is in the pipe.

v. Flushing Sequence for Lines Less than 6” in Diameter
- If filling of the pipe is to occur as the pipe sections are constructed, then sterilization shall be accomplished as the pipe is constructed, otherwise, sterilization can be done at the end of each job as long as no water is put into the pipe for any reason. Once a section of pipe between isolation valves is complete, the piping shall be hydro tested, sterilized and treated, in that order. Under no circumstance shall the pipe remain untreated for more than one week after initial filling.
- All water shall be metered into the pipe and amounts shall be tabulated and given to University Project Lead to indicate the volume of water in each pipe section between isolation valves. Pipe quantities and sizes shall also be tabulated to verify piping is filled completely.
- Two twelve (12) ounce bottles of the system water shall be taken for laboratory analysis prior to the start flushing process. University Project Lead will be responsible for providing the sample bottles to the mechanical contractor.
- System water is to be introduced to the new pipe and allowed to fill the lines and flush until it runs clear at the bypass outlined in Section 2.6, Paragraph B, Subparagraph

4 above, in the mechanical room risers of the new or retrofitted building.

- Two additional twelve (12) ounce bottles shall be gathered for laboratory analysis once treated water is in the pipe.
- Under no circumstance shall cross overs or ball valves be left underground. Where crossovers and valves are used, they must be removed, plugged, sealed and adequately insulated prior to burial, except in the case where the University Project Lead deems it necessary for underground main protection;mainly in the case of extended lay-up periods.

B. Piping Tests:

1. General: Perform tests before piping is concealed from view. Tests may be performed in sections. Tests shall be witnessed by the General Contractor and local inspectors and the test results presented to the Engineer for acceptance and approval prior to concealing piping from view. Provide all necessary equipment for testing, including pumps and gauges.

2. Test water systems hydrostatically to a pressure of 150 psig or 1-1/2 times working pressure, whichever is greater, for a period of 4 hours. Repair all leaks, replacing materials as necessary and repeat tests until systems are proven tight.

C. Inspecting: Visually inspect each run of each system for completion of joints, adequate hangers, supports, and inclusion of accessories and appurtenances.

END OF SECTION

SECTION 23 21 23 – HVAC PUMPS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the water source heat pump systems.

B. Description of Work

1. Provide pumps as specified and indicated.

C. Quality Assurance

1. Acceptable Manufacturers: Bell and Gossett, Armstrong, Aurora, TACO, Myers, Patterson, PACO, Weil, and Worthington
2. Electrical Standards

a. Provide electric motors and products which have been listed and labeled by Underwriters' Laboratories, Inc. (UL) and comply with National Electrical Manufacturers' Association (NEMA) Standards.

3. Certification, Pump Performance

1.2 PRODUCTS

A. Chilled, Condenser, and Heating Hot Water Pumps

1. Horizontal Split Case Pumps
2. End Suction Base-mounted Pumps

B. Circulating Pumps

1.3 EXECUTION

A. Inspection
B. Pump Installation
C. Electrical Connections

1. Provide positive electrical pump and motor grounding in accordance with applicable requirements of the NEC.

D. Field Quality Control
E. Split Case and End Suction Pumps.

END OF SECTION

SECTION 23 25 00 – WATER TREATMENT SYSTEMS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the water treatment systems.

B. Description of Work

1. Chemicals
2. Testing Equipment and Reagents
3. Service Representative
4. Replacement and Rework

C. Quality Assurance

1. Qualifications
2. Packaging and Labeling
3. Electrical Standards
4. Chemical Standards

D. Submittals

1.2 PRODUCTS

A. General

1. Water Analysis
2. Pre-treatment
3. Cooling tower Blow-down
4. Governing Laws

B. Closed Loop Systems

C. Open Loop Systems

1.3 EXECUTION

A. Piping System Preparation.

B. Flushing

C. Open Loop System

D. Personnel Training

END OF SECTION

SECTION 23 30 00 - DUCTWORK

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the duct systems. Comply with other Division 23 sections and drawings as applicable.

B. Description of Work

C. Quality Assurance

1. Design and Installation Standards
2. Fire and Smoke Rating Test Standards

D. Submittals

1.2 PRODUCTS

A. Ductwork Materials

1. Exposed Ductwork Materials
2. Gauges, Rectangular Ductwork
3. Gauges, Round Ductwork
4. Fiberglass Duct board

B. Miscellaneous Duct Materials

C. Boiler Flue and Breeching

1.3 EXECUTION

A. General Requirements

B. Coordination

C. General Ductwork Fabrication

D. Ductliner

E. Ductwork Installation

F. Flue and Breeshing

G. Cleaning and Protection

END OF SECTION

SECTION 23 33 00 – DUCTWORK ACCESSORIES

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the registers, grilles, and diffusers.

B. Description of Work

1. Provide ductwork accessories for the project including the following:

a. Extractors

b. Turning vanes

c. Monitors

d. Splitter Dampers

e. Access Doors

f. Straightening Grids

g. Fire Dampers

C. Quality Assurance

D. Submittals

1.2 PRODUCTS

A. Ductwork accessories, fabrication, and materials

B. Flexible Connections

1. Flexible connections shall be UL labeled, 30 ounces glass fabric-lined with insulation and coated on both sides with neoprene, complete with attachment accessories, "Vent-Glass" by Vent-Fabrics, Inc. or approved equal.

C. Ductwork Hardware

1. Damper Operators shall be Young Regulator as noted, or an approved equal unit by Duo-Dyne or Vent Fabrics, Inc.

D. Directional, volume control, and fire dampers

1. Provide all direction and volume control and fire dampers shown or noted on Drawings.

E. Flashing and counter-flashing

F. Duct access doors

G. Miscellaneous ductwork materials

H. Turning vanes

1.3 EXECUTION

A. Installation

B. Testing

END OF SECTION

SECTION 23 34 00 – FANS AND HOODS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the fan and hood systems.

B. Description of Work

C. Quality Assurance

1. Acceptable Manufacturers: Cook, ACME, Broan, Buffalo, Cames, Greenheck, Penn, and Woods.

1.2 PRODUCTS

A. Product Requirements

1. Ratings
2. Construction
3. Drives
4. Motor Sheaves

a. Motor sheaves shall be Browning Type, MVP, or approved equal, adjustable type with double-locking feature.

5. Fan Sheaves

a. Motor sheaves shall be Browning Type, MVP, or approved equal, adjustable type with double-locking feature.

6. Belts

a. Belts shall be as manufactured by Gates, Durkee-Atwood, Goodyear, Browning, or Uniroyal.

7. Bearings

a. Provide SKF, Sealmaster, Timken, or Fafnir externally or internally-mounted, grease-lubricated, self-aligning ball bearings.

8. Motor Mount

B. Centrifugal Fans

1. Provide centrifugal fans of the single-width, single-inlet type with either forward or backward curved fan blades, and adjustable belt drives.

C. Ceiling Exhaust Fans

D. Grease Exhaust Fans

1. Fan shall be a spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator, specifically designed and tested for use in applications requiring the exhaust of grease laden air.

E. Roof Mounted Smoke Exhaust Fans

1. Provide belt driven, axial type up-blast propeller roof exhaust fan, UL 705 listed.

1.3 EXECUTION

A. Ventilation and Exhaust Fans

B. Systems

END OF SECTION

23 34 00 - FANS AND HOODS

PART 1 - GENERAL

1.1 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the fan and hood systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the fan and hood systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide U.L. listed fans and ventilators as required by code and as specified.

1.3 QUALITY ASSURANCE

A. Basis of design is Cook. Other acceptable manufacturers are ACME, Broan, Buffalo, Carnes, Greenheck, Penn, and Woods.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Ratings: Fans shall be licensed to bear the AMCA certified ratings seal. Ratings of fans shall be based on 70°F and 29.92" of Hg atmospheric pressure. Air handling equipment shall be sized in conformance with applicable codes and good engineering practice. Roof-mounted units shall be located in coordination with the Architect to ensure proper sight lines.

B. Construction: Fan construction shall be in accordance with AMCA classes of construction for the intended duty. Fan wheels, shafts, and drives shall be statically and dynamically balanced at the factory as a unit. Balance reports shall be factory-certified to the Construction Manger.

C. Drives: Provide drives with a minimum belt horsepower capacity of 120% of the motor nameplate horsepower.

D. Motor Sheaves: Motor sheaves shall be Browning Type, MVP, or approved equal, adjustable type with double-locking feature. Motor sheaves shall be selected for the

rated fan rpm and shall be adjustable to as close as 10% above and below the rated fan speed.

E. Fan Sheaves: Provide adjustable or nonadjustable sheaves with removable machined bushings. Sheaves shall be machined on surfaces. Sheaves with over three grooves shall be dynamically balanced and the manufacturer shall so designate on each sheave. Fan sheaves with three grooves or less shall be statically balanced and weights required for balancing shall be welded to the sheaves. Manufacturers shall be Browning, Eaton, Yale, Towne, Dodge Manufacturing Company, or Fort Worth Steel and Machinery Company.

F. Belts: Provide standard "V-groove" belts suitable for the service intended with the required capacities. The belts shall be closely matched and tagged prior to delivery to the job site. If the belts do not appear to be properly matched during operation, they shall be rechecked and, if necessary, replaced. Belts shall be as manufactured by Gates, Durkee-Atwood, Goodyear, Browning, or Uniroyal.

G. Bearings: Provide SKF, Sealmaster, Timken, or Fafnir externally or internally-mounted, grease-lubricated, self-aligning ball bearings. Bearings shall have grease type zerk fittings.

H. Motor Mount: Motors shall be mounted on an adjustable base rigidly supported on the fan and shall have extended shaft to accommodate the adjustable pitch sheave.

2.2 CENTRIFUGAL FANS

A. General: Provide centrifugal fans of the single-width, single-inlet type with either forward or backward curved fan blades, and adjustable belt drives.

B. Motors: Provide standard drip-proof motors. Provide cast iron housings for motors larger than 10 hp, riveted or spot-weld wheels with steel rims and hub plates.

C. Fan: Blades shall be die cut, die-formed, and hubs shall be machined close-grained cast iron. Steel housings shall have lock-seam construction with discharge reinforcement and shall be adjustable with continuous inlet collars. Provide weatherproof enclosure for motors and drive, if units are exposed to weather.

2.3 CEILING EXHAUST FANS

A. General: Provide direct driven ceiling exhaust fans as required. Fan shall be acoustically insulated and have a maximum sound level rating as scheduled.

B. Motor: Motor shall be suitably grounded and mounted on rubber-in-shear vibration isolators and speeds shall not exceed that scheduled.

C. Accessories:

1. Provide totally noise-free, integral back draft damper, with no metal to metal contact.
2. Inlet grille shall be white molded plastic with egg-crate or perforated shape and provide 85% free open area.
3. Provide terminal box on the housing with cord, plug, and receptacle inside the housing.

2.4 GREASE EXHAUST FANS

A. General: Fan shall be a spun aluminum, roof mounted, belt driven, upblast centrifugal exhaust ventilator, specifically designed and tested for use in applications requiring the exhaust of grease laden air.

B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

C. Construction: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. The windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Lifting lugs shall be provided to help prevent damage from improper lifting. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM. Unit shall be shipped in ISTA certified transit tested packaging.

D. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

E. Motor: Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure.

F. Bearings: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty re-greasable ball type in a cast iron pillow block housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

G. Belts & Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

H. Grease Capture: Provide with grease capture and containment system.

2.5 ROOF MOUNTED SMOKE EXHAUST FANS

A. General: Provide belt driven, axial type up-blast propeller roof exhaust fan, UL 705 listed.

1. The fan construction shall meet the specification for U.L. Listed “Power Ventilators for Smoke Control Systems”. This includes the IRI requirements of 500 °F air for a minimum of 4 hours, the SBCCI “Standard Fire Prevention Code” requirements of 1000 °F air for a minimum of 15 minutes, and the Snow Load Test for butterfly dampers in UL-793.

B. Motor: Motors shall be permanently lubricated, heavy-duty type, and located outside of the air stream.

C. Fan: Propellers shall be constructed of fabricated steel, fabricated aluminum or cast aluminum blades and hubs. Propellers shall be securely fastened to fan shaft. Propellers shall be statically and dynamically balanced.

D. Curb: The fan shall be furnished with a 14” high, insulated curb.

E. Options and Accessories: Outlet screen to prevent debris from getting inside discharge and dampers, butterfly dampers with weather tight gaskets, 165 °F fusible link damper lifters, magnetic damper latches, belt tube with heat shields, high temperature bearings and extended lubrication lines.

PART 3 - EXECUTION

3.1 VENTILATION AND EXHAUST FANS

A. General: Ventilating and exhaust fans not having integral vibration isolation shall be mounted on or suspended by vibration isolators as specified under Section 23 05 48. Where ductwork is connected to fans, Contractor shall provide UL labeled flexible duct connections.

B. Curbs: Factory-fabricated roof curbs, caps, and similar items, shall be supplied and installed by Mechanical Contractor. Coordinate installation with Roofing Contractor.

3.2 SYSTEMS

A. Refer to Section 23 05 53, “Mechanical Identification” for applicable painting, nameplate, and labeling requirements.

B. Placement of fans and noise levels generated by the fans shall be taken into consideration. Refer to specification 23 34 00 for additional information.

END OF SECTION

SECTION 23 37 00 – REGISTERS, GRILLES, AND DIFFUSERS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the registers, grilles, and diffusers.

B. Description of Work

1. Provide air outlets and inlets as required for the finished or non-tenant areas of the project including the following:

a. Ceiling air registers, grilles, diffusers

b. Wall mounted registers and grilles

c. Linear lay-in slot diffusers

d. Architectural linear diffusers

C. Quality Assurance

1. Acceptable Manufacturers: Titus, Krueger, Anemostat, Cames, Metal Aire, Price, and Tuttle & Bailey.

1.2 PRODUCTS

A. Air Outlets and Inlets

1. General

a. Provide air outlets and inlets of the size, shape, and type, constructed of materials and components, and with finishes as required.

2. Ceiling Diffusers

a. Provide diffusers with corrosion resistant treated surfaces and finished in baked enamel unless otherwise required.

3. Registers and Grilles

a. Provide registers that contain a key-operated multi-louvered opposed blade damper operable from the face side.

4. Supply Linear Diffusers

a. The diffuser shall be designed, tested, and constructed in a manner so as to comply with the performance criteria and sound level requirements specified elsewhere in these Specifications.

1.3 EXECUTION

A. Installation

B. Field Control Quality Control

END OF SECTION

SECTION 23 57 19 – PLATE AND FRAME HEAT EXCHANGERS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the heat exchanger system.

1.2 PRODUCTS

A. Quality Assurance

1. Acceptable Manufacturers: Alfa Laval, Bell and Gossett, Mueller, Tranter, and SONDEX.

B. Heat Exchanger System

1. Plate and frame heat exchangers shall be designed, fabricated and tested for operation in accordance with the A.S.M.E. Unfired Pressure Vessel Code, Section VIII, Division 1, including latest addendum and code stamped where required.
2. Fixed and movable end frames shall be reinforced, flat plate SA-516-70 carbon steel design.
3. Tightening bolts shall be SA-193-B7 zinc plated carbon steel with fixed SA-194-2H carbon steel nut.
4. Free nuts shall be heavy SA-194-2H carbon steel with heavy-duty carbon steel washers.
5. Plates shall be fabricated of 304 stainless steel.
6. Gaskets shall be molded one piece, nitrile rubber, securely cemented into the continuous groove in each plate.
7. All exterior steel surfaces shall be sharp steel shot blasted to SSPC-S-6-63 followed by one coat of two part epoxy spray enamel baked at 250ºF.

1.3 EXECUTION

A. Installation

B. Start-Up

C. Testing and Adjusting and Cleaning

END OF SECTION

23 73 00 - CHILLED WATER AIR HANDLING UNITS

1.0 GENERAL

1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the boiler system. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the air handling unit system specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

D. Refer to Section 23 25 00, “HVAC Water Treatment”, for information regarding required chemicals, etc.

1.02 DESCRIPTION OF WORK

A. Provide variable air volume chilled water air handling unit and all associated components and specialties as specified herein, on the drawings, or as otherwise required to maintain the design chilled water supply conditions.

1.03 QUALITY ASSURANCE

A. Manufacturer: Basis of design is Trane. Approved alternate manufacturers are Carrier, McQuay, or Johnson Controls, Inc.

B. Submittals must be provided including equipment dimensions, installation, clearance, performance at specified conditions, etc.

2.0 PRODUCTS

2.01 AIR HANDLING UNITS

A. Units shall consist of the components listed below and shall perform in accord with capacities as scheduled on the drawings.

B. Casing: Includes all sections of air handling unit: coil section, fan sections, access sections, sections of blow through units downstream of cooling coils, etc. Refer to SECTION 23 30 00 for discharge plenums which attach to air handling unit vertical discharge opening.

1. Wall and roof panels shall be minimum 2" thick acoustical type constructed of minimum solid galvanized exterior panel (min. 16 ga.) and a solid interior panel (min. 20 ga). Acoustical fill shall be glass fiber insulation, 1.5 pounds per cubic foot minimum density. Fill shall comply with the following U.L. Fire Resistance Ratings:

Flame Spread	10 - 20
Fuel Contributed	10 - 15

Smoke Developed 0 – 20

2. Floor construction shall be structural longitudinal and perimeter base rail with 20 gage solid galvanized inner and 16 gage galvanized outer panels.
3. Access door panels shall be constructed identically to the wall panels. Doors shall be of gasketed to provide an airtight perimeter of the door. The latches shall be wedge lever type, minimum 2 per door. The door hinges shall be lift off type.
4. Air Handler shall be double wall construction with no through metal in the casings or doors.

C. Fans:
1. Fans shall deliver the scheduled capacities. Fans shall be airfoil type. Fans shall be furnished complete including: motor, motor mount, inlet bells (if applicable), 2" deflection spring type vibration isolation, discharge section (if applicable), drive mechanisms and all other accessories required and/or specified to produce the intended result.
2. Fans shall be forward curved type with variable speed drive.

D. Water coil(s) shall be constructed in accordance with ARI Standard 410-87. Coils shall have aluminum fins mechanically bonded to seamless copper tubes with copper headers and return bends. Coils shall be leak tested under water at 350 PSI of dry air.

E. Drain pan(s) shall be #304 stainless steel. Drain pans shall form positive built-in slope of the trough to the drain connection. Drain pan shall drain dry to preclude the buildup of microbial slime or fungus. Each cooling coil shall have a drain pan under the entire coil extended at least 6" past the leaving air side of the coil and minimum of 2 1/2" deep. When air handling units are furnished with stacked coils, upper drain pans shall have a minimum of two 1" drain connections piped to the lower pan and secured to prevent vibration. All condensate piping shall be of hard drawn copper tubing.

F. Filter section and frame shall accommodate high efficiency filters. Filter section shall have full height hinged access doors and holding frames shall be welded in place. Frames shall include spring clips for filter retention.

G. Each air handling unit shall be constructed and shall operate for all conditions of air flow to provide acceptable an NC levels (max NC 35) in the occupied tenant space immediately adjacent to the fan room.

H. The unit manufacturer shall submit sound power levels of each air handling unit. Acoustic performance shall be based on data obtained in accordance with ANSI Standard SI-32, for discharge sound power levels and radiated sound power levels. Aerodynamic performance data shall be in accordance with ARI Standard 430. Maximum sound power levels shall not exceed:

	63	125	250	500	1k	2k	4k
Discharge PWL's (re.10^{-12}W)	88	88	87	86	85	85	85
Inlet/cabinet PWL's	88	85	85	84	83	81	81

3.0 INSTALLATION

3.01 AIR HANDLING UNITS

A. Install the air handling unit(s) where indicated on the drawings, observing required clearances. See related specification sections concerning ductwork, piping and electrical work to assure proper connection of services to the unit. Follow the manufacturer's written instructions concerning start-up and installation. The unit shall not be started or run without filters in place.

B. Contractor shall arrange piping to units so as to provide required access to equipment.

C. Install clean filters in unit at time of air balance. Provide temporary filters during construction.

END OF SECTION 23 73 00

SECTION 23 73 00 – CHILLED WATER AIR HANDLING UNITS

1.1 GENERAL

A. Summary

1. This section describes the basic materials and installation methods for the boiler system.

B. Description of Work

C. Quality Assurance

1. Acceptable Manufacturers: Trane, Carrier, McQuay, and Johnson Controls, Inc.

1.2 PRODUCTS

A. Air Handling Units

1. Casing

a. Wall and roof panels shall be minimum 2" thick acoustical type constructed of minimum solid galvanized exterior panel (min. 16 ga.) and a solid interior panel (min. 20 ga).

2. Fans

a. Fans shall be forward curved type with variable speed drive.

3. Water Coil(s)

a. Coils shall have aluminum fins mechanically bonded to seamless copper tubes with copper headers and return bends.

4. Drain Pan(s)

a. Each cooling coil shall have a drain pan under the entire coil extended at least 6" past the leaving air side of the coil and minimum of 2 1/2" deep, made of #304 stainless steel.

5. Filter section and frame shall accommodate high efficiency filters.

1.3 EXECUTION

A. Air Handling Units

END OF SECTION

SECTION 23 82 19 – FAN COIL UNITS

1.1 GENERAL

A. Summary

1. This Section includes fan coil units and accessories.

B. Submittals

C. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Acceptable Manufacturers: Trane Co. (The); Unitary Products Group, Carrier Corporation, A United Technologies Company, and Daikin McQuay.

B. Fan Coil Units

1. Coil Section Insulation: 1 inch thick, [coated glass fiber] [foil-covered, closed-cell foam] [matte finish, closed cell foam] complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
2. Main and Auxiliary Drain Pans: Stainless steel, insulated galvanized steel with plastic liner formed to slope from all directions to the drain connection as required by ASHRAE 62.
3. Chassis: Galvanized steel where exposed to moisture.
4. Cabinet: Steel with baked enamel finish in manufacturer’s standard paint color as selected by Owner.
5. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
6. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F.
7. Fan and Motor Board: Removable

    a. Fan: Forward curved, double width, centrifugal; directly connected to motor.

    b. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board.

8. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints.
9. Electrical Connection

C. Ducted Fan Coil Units

1. Coil Section Insulation: 1 inch thick coated, foil faced, flass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
2. Drain Pans: Stainless steel, galvanized steel with plastic liner, formed to slope from all directions to the drain connection as required by ASHRAE 62.1.

3. Chassis: Galvanized steel where exposed to moisture, with baked enamel finish and removable access panels.
4. Cabinets: Steel with baked enamel finish in manufacturer's standard paint color.

    a. Supply Air Plenum: Sheet metal plenum finished and insulated to match the chassis with mill finish, aluminum, double deflection grille.

    b. Return Air Plenum: Sheet metal plenum finished to match the chassis.

    c. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor and return air, formed steel dampers.

    d. Dampers: Galvanized steel with extruded vinyl blade seals, flexible metal jamb seals, and interlocking linkage.

5. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
6. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering water temperature of 220 deg F.
7. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single speed motor installed on an adjustable fan base resiliently mounted in the cabinet.
8. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints.
9. Electrical Connection

1.3 EXECUTION

A. Installation

B. Field Quality Control

END OF SECTION

SECTION 26 01 00 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The Drawings are schematic and are not intended to show the exact location of outlets, devices, etc. or the routing of conduit.

B. Dimensions and information regarding accurate locations of equipment, and structural limitations and finish shall be coordinated and verified with other Divisions of Work. Be prepared to provide dimensions and information regarding the Work of this Division to other trades.

C. The right is reserved to relocate any device (receptacle, switch, fire alarm, audio/visual, junction box, outlet, etc.) a maximum of 10’-0” before it is permanently provided without incurring additional cost to the Contract.

1.2 REFERENCE STANDARDS

A. All work shall comply with the most recently revised versions of all local, state and federal codes, ordinances of the authority having jurisdiction, laws, rules and regulations. Any modifications required by any of the above shall be made without any additional cost to the owner. Where requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.

B. Nothing contained in the Contract Documents shall be construed as authority or permission to disregard legal requirements and regulations. The Contractor shall thoroughly review the Documents and bring any such conflicts to the attention of the Architect and Engineer prior to installation.

C. All materials shall be new and shall bear the label of U.L.

1.3 EXISTING CONDITIONS

A. Where work is to be performed in an existing facility, the contractor shall visit the site prior to bid and be familiar with all existing conditions. Special attention shall be given to work to be performed above an existing ceiling.

B. Where existing slabs are to be cut or core drilled, the contractor shall x-ray the existing slabs to avoid cutting or disrupting existing conduits, cables, plumbing or structural members.

C. The electrical service to the building shall not be interrupted without written consent of the building owner.

D. No allowance will be made for lack of knowledge of existing conditions.

E. At the completion of the project, all work under this Division shall be completely integrated with the existing systems and left in perfect operating condition.

F. Where work under this Division disrupts the continuity of any existing to remain circuit or feeder, the Contractor shall repair/replace as necessary to return to a perfectly functional and safe operating condition.

G. Prior to any demolition or construction the Contractor shall have the existing conditions inspected by an EPA, OSHA certified asbestos abatement agency to identify the presence of asbestos. Should any asbestos be found it shall be brought to the immediate attention of the Architect and Owner and specifically identified in writing.

1.4 DEFINITIONS

A. Provide: to furnish, install and connect.

B. Furnish: to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

C. Install: to join, unite, fasten, link, attach, set-up or connect together, complete, tested, and ready for normal satisfactory operation.

D. Engineer: the Engineer of record.

E. Contract Documents: the complete set of Specifications and Drawings of all Divisions.

F. Work: labor, materials, equipment, accessories, controls and other items required for a complete installation.

G. Concealed: embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

H. Conduit: rigid steel; intermediate metal conduit (IMC), plastic conduit (PVC), electrical metallic tubing (EMT), or flexible steel conduit.

I. Manufactured Cable: pre-wired metal clad manufactured cable bearing a U.L. label; metal clad cable (MC), health care (HCF).

J. Wiring/Wired: all wire installed in conduit to equipment, device, junction box, light fixture, etc. from panel board or switchgear with all required boxes, connectors, couplings, etc.

K. Exposed: not installed underground or concealed.

L. Equal: equal in quality, workmanship, materials, weight, size, design and efficiency of the specified product, conforming to manufacturers.

M. Supply: to purchase, procure, acquire and deliver complete with related accessories.

N. Authority Having Jurisdiction (AHJ): applicable local, state and federal authorities having jurisdiction over any part of the Scope within this Division and other Divisions.

1.5 SHOP DRAWINGS AND PRODUCT DATA

A. The Contractor shall obtain complete shop drawings, product data and samples from the manufacturers, suppliers, vendors for all materials and equipment as specified herein in various Sections of the Specifications, and shall submit data and details of such materials and equipment for review per Section 01 33 00.

B. Shop drawings and/or product data shall be submitted for the following for review:
1. Switchboards, panelboards, transformers, busway, motor control centers, ground fault system and other equipment associated with the main distribution.

2. Disconnect switches, fuses, motor starters.
3. Lighting fixtures, lighting control system, dimming system, emergency batteries and other equipment associated with lighting.
4. Transient voltage surge protection.
5. Generator, UPS, transfer switches, batteries, static switches, transition switches, switchgear and other equipment associated with emergency and/or standby back-up power systems.
6. Devices, receptacles, switches, coverplates, motion sensors. The product data shall include the manufacturers name, model number, size and color.
7. Conduit, wire, boxes, fittings.

1.6 AS-BUILT DRAWINGS

A. The Contractor shall maintain on a daily basis at the Project site a complete set of "Record Drawings". Project Record Documents shall be maintained as specified in Division 01.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer's names and catalog numbers specified in the Contract Documents are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Request for approval of material not specified shall be considered if the request is in written form and submitted to the Architect no later than fourteen (14) days prior to the bid date. All requests shall conform to the provisions of the general and supplementary conditions.

B. When specific names are not stated, only the best available quality of material or equipment shall be submitted for review and used in the installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The equipment selections used in the preparation of the Contract Documents will fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the Code requirements and the requirements of the local Authorities having jurisdiction, and the equipment manufacturer's recommendations.

B. In the preparation of Drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access, and proper fit rests with the Contractor.

C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.

D. The General Contractor and all Subcontractors shall coordinate the installation of ductwork, conduit, busway, piping, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment, and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit,

busway, piping or cable is found to be in conflict with the architecture, structure, or other trade Work which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping or cable shall be relocated without additional cost to the Owner.

E. No conduit, equipment, busway, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build-out and flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Engineer.

F. Accessibility and Clearance:
1. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations, avoiding obstructions, preserving headroom, and keeping openings and passageways clear.
2. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functionality of the equipment.

G. Scaffolds and staging for installation of electrical work shall be provided under the work of this Division.

3.2 STRUCTURAL FITTINGS

A. Provide the necessary sleeves, inserts, hangers, anchor bolts, and related structural items. Provide at the proper time.

B. Openings may have been indicated on the Architectural and Structural drawings. Should any additional openings or holes be required, the same shall be provided at no additional cost to the Owner.

C. Location: At a time in advance of the work, verify openings shown on the Architectural and Structural drawings, and coordinate any additional openings.

D. If the work of this Section requires modification of the Architectural or Structural drawings, provide new instructions as to requirements for these openings. Submit for review and coordination to Architect.

E. Sleeves shall be supplied for electrical conduits passing through walls or slabs and shall be placed before concrete is poured.

F. Equipment supports for electrical work shall be fastened to the structure by inserts, anchor bolts, bolting to drilled and tapped structural members, or be welded to the structure.
1. Welding shall be done by the electric arc method with fully competent welders. Supporting members shall be shop coated with a suitable primer.
2. Surfaces damaged by installation of supports shall be touched up with primer to match shop coat. Any drilling of structural members shall be approved by the Architect.

G. Flashing:
1. Wherever conduits pass through the roof or outer walls, base flashing and counter flashing shall be provided.
2. Such flashing shall be properly installed by skilled workmen, and shall include grouting, mastic or tar application, or other means to insure a permanent, waterproof, neat and workmanlike installation.
3. Insofar as possible, flashing shall comply with and be similar to requirements for flashing in General Construction Work.

H. Anchor bolts and inserts shall be galvanized and of adequate size and strength for installation of electrical work and shall be placed in forms before concrete is poured.
   1. Placement of bolts in bases shall be done under other Division. Provide detail drawings, templates, and anchor bolts for bases to the General Contractor in time to avoid delaying work schedules.
   2. Expansion shields shall only be used with specific approval of the Architect. Wooden or soft metal plugs shall not be used.

I. Cutting and patching:
   1. All additional cutting, patching and reinforcement of construction of building, subject to review by the Architect, shall be performed under this Section.
   2. Refer to appropriate Division for requirements.

3.3 WEATHERPROOF EQUIPMENT

A. Electrical devices or equipment located in damp, semi-exposed areas shall be weather-resistant. Enclosures shall comply with NEMA Type 3R requirements.

B. Surface mounted outlet boxes shall be cast metal with threaded bolts. Pull or junction boxes shall be cast metal with bolted and gasketed covers.

C. Outlet box covers shall be of a suitable weatherproof type with gaskets, packing glands, weatherproof doors, or other required means to prevent entry of moisture.

D. Lighting fixtures shall be provided with suitable gasket, and UL labeled for location.

3.4 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Painted exposed work soiled or damaged: Clean and repair to match adjoining work before final acceptance.

C. Remove dust and debris from inside and outside of material and equipment.

3.5 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Numbered adhesive strip tags shall be attached to branch circuit wiring in conduits at every point where runs are broken or terminated. Also tag pull wires in empty conduits.

B. Junction and Pull boxes shall have covers stenciled with box number when shown on the drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting to finish.

3.6 TESTS AND DEMONSTRATIONS

A. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

B. All motors shall be checked and adjusted for correct direction of rotation.

C. Loading of circuits and feeders in panelboards shall be checked and balanced.

D. Any work found not to be in compliance with the Contract documents shall be repaired or replaced without incurring additional cost to the Contract price.

E. Provide all instruction to the Owner on maintenance and operation of all systems and equipment provided under this Division.

3.7 WARRANTIES

A. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter and shall include at least one (1) full heating season and one (1) full cooling season.

B. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.

C. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion", by the Owner or the Owner's Representative for each item of material, equipment or system.

D. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating an/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.

END OF SECTION 26 01 00

SECTION 26 05 00 – RACEWAYS AND WIRING – 600 VOLT

1.1 GENERAL

A. Provide all raceways and wiring specified and as required to provide a complete system through-out the project.

1.2 PRODUCTS

A. Conduit (GRC, IMC, EMT):
1. Allied
2. Republic
3. Triangle
4. Wheatland

B. Conduit Fittings (GRC, IMC, EMT):
1. Appleton
2. O.Z. Gedney
3. Steel City
4. Thomas and Betts
5. Raco

C. Flexible Metal Conduit:
1. AFC
2. Alflex
3. Anaconda
4. International Metal Hose

D. Liquidtight Flexible Metal Conduit:
1. American Brass Company
2. Anaconda
3. Electri-Flex Company

E. PVC Conduit and Fittings:
1. Thomas & Betts
2. Prime Conduit
3. Cantex
4. Certainteed
5. Triangle

F. Conductors, Copper, 600 Volts or less:
1. American Insulated Wire
2. Cablec
3. General Cable
4. Pirelli
5. Southwire
6. Triangle
7. Drakar (Fire Resitive Cables) or UL approved equal

G. Outlets and Boxes:
1. Appleton
2. Raco
3. Steel City
4. Midland

1.3 EXECUTION

A. Provide conductors of stranded copper, 98% conductivity, new building wire, insulated in accordance with the requirements of the NEC. Insulation shall be rated no less than 600-volt. Conductors shall be Type “THHN”, “THHW” or “XHHW”. Conductors for service and distribution feeders shall be”XHHW”. Solid conductors terminating in a breaker or device shall be utilized for wire size No. 12 and No. 10 Sizes specified are AWG gauge for No. 4/0 and smaller and circular mils (kcmil) for sizes larger than No. 4/0. Minimum wire size shall be No. 12.

B. PVC (encased in 4” concrete on all sides) or Galvanized Rigid Steel (GRC) meeting corrosion resistant protection of NEC 300.6 shall be used for underground service entrance and underground feeders. When PVC is used, a transition to metal conduit shall be made below grade using GRC 90 degree fitting such that only metal conduit exits concrete or ground.

C. GRC or Intermediate Metal Conduit (IMC) shall be used where exposed and subject to physical damage, or installed in damp or wet locations.

D. Rigid Plastic Conduit (PVC) shall be used for underground branch circuits, underground feeders where to run below the slab on grade, 1” maximum in the slab on grade, 1” maximum in the slabs above grade, in concrete columns and concrete wall and in masonry walls.

E. PVC Schedule 80 (or GRC meeting corrosion resistant protection of nec 300.6) may be used for direct burial for branch circuits only. When PVC is used, a transition to metal conduit shall be made below grade using GRC 90 degree fitting such that only metal conduit exits concrete or ground.

F. Electrical Metalic Tubing (EMT) shall be used for branch circuits concealed in walls and ceilings. EMT may be used for feeders where not exposed to damage and/or not installed in wet or damp locations.

G. Flexible Metal Conduit shall be used for connections to rotating or vibrating equipment. The lengths shall be as short as possible, in no case longer than 6’ or shorter than 12”.

H. Liquidtight Flexible Metal Conduit shall be used for connections to rotating or vibrating equipment where located outdoors or in damp or wet locations. The lengths shall be as short as possible but in no case longer than 6’ or shorter than 12”. Liquidtight Flexible Metal Conduit shall NOT be located above a ceiling in an air shaft or in a mechanical room utilized as a return air plenum.

I. The minimum size conduit shall be ¾“diameter.

J. Where feeders or circuits are required to be fire protected by NEC Articles 517, 695, 700, 708 and 760 as well as NFPA 72, NFPA 101, NFPA 130 and NFPA 502. They shall be installed either: 1) Outside the building and protected as defined by Code; 2) Encased in a minimum 2 in of concrete; 3) Be protected by a fire-rated assembly to achieve a minimum fire rating of 2 hours and dedicated to the equipment served; 4) Be a listed electrical circuit protective system with a minimum 2-hour fire rating. Feeders for life safety distribution systems under NEC Article 700 where routed in sprinkler protected spaces are considered to be protected.

END OF SECTION 26 05 00

SECTION 26 05 26 – GROUNDING SYSTEM

1.1 GENERAL

A. Provide all equipment, materials, tools and labor to provide a complete grounding system.

1.2 PRODUCTS

A. All equipment and materials provided under this Section of the Specifications shall be new, UL listed, and bear the UL label.

B. All switchboards, panelboards, motor control centers, transformers, busway, etc. shall be provided with a copper equipment ground bar bolted, brazed, or riveted to the associated enclosure or cabinet. All receptacles, switches, disconnects, individual motor controllers, etc. shall be provided with a grounding terminal connected to the device frame or enclosure.

C. All conduit, cable tray, manufactured wiring systems, raceways, junction boxes, pull boxes, etc. shall be made electrically continuous by means of grounding conductors, bonding jumpers, grounding bushings, etc. as required by the NEC and the authorities having jurisdiction.

D. All ground rods shall be a minimum of ¾” x 10’-0” copper clad steel unless otherwise indicated on the Drawings.

1.3 EXECUTION

A. Grounding Electrode System:

1. Provide a made electrode consisting of three (3) ground rods spaced 6’ apart in the form of an equilateral triangle. Each rod shall be installed a minimum of 12” below finished grade and a minimum of 36” clear of the foundation with No. 3/0 bare stranded copper conductors bonded together 24” below finished grade to form a loop (grounding triad).
2. Extend from the made electrode a No. 3/0 insulated stranded copper conductor in a 1 1/4” conduit to a single point ground bar (Erico EGBA 14412BB) at each main service disconnect and connect to the main disconnect neutral bar, housing and frame using No.3/0 stranded conductor.

3. Provide a building grounding riser as follows:

    a. Provide a single point ground bar in the main electrical room connected to the made electrode and each service main disconnect with a No. 3/0 insulated stranded copper conductor in a 1” conduit.

    b. Provide a ground bar in each branch electrical room connected to the ground bar in the main electrical room with an insulated stranded copper conductor in a conduit.

    c. Provide a ground bar in each communications room (and other rooms as noted on the Drawings) connected back to the closest electrical room ground bar on the same floor with an insulated stranded copper conductor in conduit.

4. The following electrodes shall be bonded together with a No. 3/0 insulated stranded copper conductor in 1” conduit to form a grounding electrode system:

    a. Made electrode described above.

b. Underground main metallic water pipe. Connect ahead of the first valve and provide a bonding jumper across the water meter.

c. Structured steel building frame.

d. Where the above electrodes are not available or feasible, provide suitable grounding electrodes per NEC.

B. After completion of the grounding system measure the system ground resistance. If the resistance to ground exceeds 5 ohms, additional ground rods, or other method approved by the Engineer, shall be provided until a reading of 5 ohms or less is achieved.

END OF SECTION 26 05 26

SECTION 26 05 50 – ELECTRICAL IDENTIFICATION

1.1 GENERAL

A. Provide all equipment, materials, tools and labor to properly identify electrical equipment and related accessories.

B. Provide identification for the following:

1. Switchgear, switchboards, distribution panels, panelboards, disconnect switches, circuit breakers, motor starters, motor control switches, start/stop buttons, EPO switches, and other electrical equipment.
2. Junction boxes and pullboxes.
3. Wiring devices.
4. Wiretags for wiring.
5. Raceways.

1.2 PRODUCTS

A. Nameplates

1. Nameplates shall have the surface color and core color for engraved letters as follows:

a. Normal distribution: 277/480V.equipment – white surface with black core; 120/208V.equipment – black surface with white core.

b. Emergency distribution: 277/480V.equipment – white surface with yellow core; 120/208V.equipment – yellow surface with white core.

2. Provide a nameplate for each switchgear, switchboard, panelboard, distribution panel, motor starter, disconnect switches, motor control center and similar distribution equipment clearly indentifying the equipments' name to match that indicated in the Drawings.
3. Provide a nameplate for each feeder protective device in each switchgear, switchboard, distribution panel, motor control center and any other similar equipment. Identify the specific load it serves.
4. Nameplates shall be bakelite, 1/16" thick minimum with 3/8" high letters.

B. Junction Boxes and Pullboxes

1. Provide identification with permanent ink marking pen on the cover of junction boxes noting the branch circuits and systems within the conduit.
2. Pullboxes shall be marked using stenciled paint noting the voltage and systems served. Letters shall be appropriate height so that they can be read from the floor.

C. Wiring Device wall plates

1. Provide identification on the face of the coverplate with printed lettering on a white adhesive background as to the panel and circuit the outlet is served. Characters shall be ¼" high.

D. Electrical boxes and covers shall be color coded as follows:

1. 120/208V Normal Power – Silver (Unpainted)
2. 277/480V Normal power – Yellow
3. Emergency Power (NEC Art. 700) – Orange
4. Standby Power (NEC Art. 701/702) – Green
5. Fire Alarm System – Red – Conduit shall be painted red every 10' o.c. (at couplings), at elbows and all black boxes.

6. Telecommunications – Blue
7. Security - White

1.3 EXECUTION

A. Nameplates shall be applied to a cleaned surface and shall be plumb and level.

END OF SECTION 26 05 50

SECTION 26 24 00 – SERVICE AND DISTRIBUTION – 600 VOLT

1.1 GENERAL

A. Provide all distribution switchgear as specified herein, as indicated on the Drawings and as required to provide a complete and operating system. All distribution equipment shall be of the same manufacturer including, but not limited to, switchboards, panelboards, transformers, disconnects, and busway.

B. The distribution equipment shall be designed, manufactured and tested in accordance with the latest version of the following standards:

1. NFPA 70
2. NEMA AB1
3. NEMA KS1
4. NEMA PB2
5. NEMA PB1
6. NEMA PB1.1
7. NEMA PB2.1
8. NEMA PB1.1
9. NEMA 250
10. NEMA TP-1-2002
11. ANSI/IEEE C12.1
12. ANSI C39.1
13. ANSI C57.13
14. UL 50, 67, 89, 98, 489
15. ASTM

C. Provide and install the building electrical service from the utility transformer(s) to the main service distribution equipment.

1.2 PRODUCTS

A. Switchboard

1. Switchboards shall have a minimum short circuit rating of 65,000 amps RMS.
2. Bus bars shall be silver-plated copper.
3. Main device shall be individually mounted insulated case circuit breaker.
4. Feeder devices shall be group mount molded case circuit breakers or when larger than 1200 amps shall be individually mounted insulted case circuit breakers.
5. All main breakers and feeder breakers 1200A or larger shall be connected to an energy reducing maintenance switch with indicator light. Device shall comply with NEC Article 240.87.
6. An adjustable ground fault protection system shall be provided as an integral part of the main circuit breaker, designated feeder breakers and fused switches where required by code.

B. Panelboards

1. Boxes shall be a nominal 20 inches wide and 6 inches deep with wire bending space per the National Electric Code.

2. Fronts shall be door-in-door construction with reinforced steel with concealed hinges and concealed trim adjusting screws. Trim clamps are unacceptable.
3. Bus bars shall be copper, phase sequenced, fully insulated and supported by high impact Noryl (or equal) interior base assemblies.
4. Molded case circuit breakers shall be bolt-in devices for 120/208V panels and 277/480V panels.

C. Distribution Panelboards

1. Provide a four-piece front to cover wiring gutter and wiring access areas. Provide a lockable hinged door with semi-concealed hinges to cover access to circuit breakers.
2. Hinged door fronts shall be provided with a lockable inner door with leaf hinges. An inner door shall cover the circuit protective devices and shall be able to be locked.
3. Bus bars shall be copper.

D. Transformers

1. System Description
   a. Power transformers shall be 2 winding dry type for general power and lighting applications. Transformers rated 1000 K VA or below shall be UL listed, NEMA TP-1-2002 standard for energy efficiency, and bear required UL Listing Mark.
2. Dry-type general purpose transformers shall be rated as indicated in Drawings.
3. Coils shall be copper.

E. Manufacturers

1. Square D
2. G.E.
3. Siemens
4. Eaton

F. Rating and Coordination

1. All non-emergency systems shall be series rated.
2. All emergency systems shall be fully rated and selectively coordinated.

1.3 EXECUTION

A. After the electrical distribution system has been checked, adjusted, calibrated and under load just prior to substantial complete, it shall be subjected to an infra-red thermograph test by a NETA certified technician. The test shall be performed with a minimum load of 20% of the rating of the equipment/connection being tested. Load banks shall be supplied if necessary to provide this load factor.

END OF SECTION 26 24 00

SECTION 26 27 00 – DEVICES

1.1 GENERAL

A. Provide all devices as required to provide complete and operating systems.

B. The wiring devices shall be designed, manufactured and tested in accordance with the latest version of the following standards:

1. NEMA WD-1
2. NEMA WD-5
3. Underwriters Laboratories
4. NEC

1.2 PRODUCTS

A. The color of all devices, wall plates and coverplates shall be gray.

1. Wall switches, unless noted otherwise, shall be flush mounted side wire only, commercial grade 120/277 volt, 20 amp, toggle switches:

a. Single Pole: Hubble CS 120GY

b. 3-Way: Hubble CS 1223GY

c. 4-Way: Hubbell CS 1224GY

d. Acceptable manufacturers are Hubbell as specified above or equal by Leviton, P&S, Cooper.

2. Provide occupancy sensors and controls as follows:

a. Mechanical, Electrical, and Telecom Rooms, Storage Areas, Closets, Watt Stopper TS – 400- 24 Inteliswitch TS Digital Time Switch.

b. Classrooms, Conference Rooms, Offices, Break Areas, Leviton OSC30-M0W Multi-Technology Ceiling Mount Occupancy Sensor.

c. Restrooms, Hallways, Leviton OSC20-U0W Ultrasonic Ceiling Mount Occupancy Sensor.

d. Janitor Closets, Small Rooms (i.e Copy or Break), Some Offices, Leviton ODS0D-IDI Passive Infrared Wall Switch.

B. Receptacles

1. Receptacles shall be plastic, 2P, 3W, NEMA 5-20R (or as required). Grounded Hubbell C5352 GY or equal by Leviton, P&S or Cooper.

2. Ground Fault Interrupter Receptacles (GFCI) shall be plastic, 2P, 3W, 125 volt, 20 amp, self-protecting type Hubbell GFR 5352GYA or equal by Leviton, P&S or Cooper.

3. Weather receptacles shall have a duplex GFCI receptacle as specified above with a gasketed extra-duty in-use weatherproof coverplate T&B CKLSVU or approved equal by P&S, Leviton or Hubbell.

C. Coverplates

1. Coverplates shall be satin finish 302 stainless steel standard size (provide jumbo size for concrete and masonry walls) by Hubbell, Grainger, Leviton, P&S.

1.3 EXECUTION

A. Provide appropriate outlet box for each device or multi-ganged devices.

B. Each device shall have a coverplate as is appropriate for the application. Coverplates shall be installed true and plumb with building lines, mortar joints and architectural features.

C. Mount receptacles and special systems outlets vertical and 18” above the finished floor to the device centerline, unless noted or required otherwise.

D. Mount switches vertical and 48” above the finished floor to the device centerline and 6” from a door strike, unless noted or required otherwise.

END OF SECTION 26 27 00

SECTION 26 29 00 – MOTOR CONTROLS AND WIRING

1.1 GENERAL

A. Provide all equipment, materials, tools, and labor to provide a complete system for motor operation.

B. A Motor starter shall be provided by Division 26 for each motor except for those specified in Divisions 21, 22 or 23 to be furnished by that Division. All motor starters not integral to the equipment served shall be installed and connected by Division 26.

C. All low voltage control wiring shall be provided by Division 21, 22 or 23 unless specifically noted otherwise on the Drawings.

1.2 PRODUCTS

A. All motor starters shall be UL listed.

B. Motor starters shall be provided with auxiliary dry contacts as follows:

1. NEMA size 3 and larger: two (2) N.O. and two (2) N.C.
2. NEMA size 2: two (2) N.O. and one (1) N.C.
3. NEMA size 1 and 0: one (1) N.O. and one (1) N.C.

C. In general, motor starter enclosures shall be NEMA Type 1, general purpose unless exposed to the weather or unless otherwise specified on the Drawings. Motor starters exposed to the weather shall be NEMA Type 3R watertight.

D. Each motor starter shall be equipped with a handoff-automatic or start-stop push-button, as required by Division 15. Provide green LED light for “RUNNING”, red LED light for “STOPPED”. Provide amber LED light reading “TRIPPED” and interfaced with overload relay alarm contacts. Two-speed motor starters shall have “fast-slow” LED lights as well as a fast-slow selector switch in conjunction with the HOA as required by Division 23. LED lights will be operated by an interlock in the motor starters not placed across the operating coil. In addition to the holding interlock and LED light interlocks, each starter shall have four extra interlock contacts – two normally open and two normally closed.

E. Acceptable manufacturers are General Electric, Square ‘D’, Cutler-Hammer, Siemens, Allen-Bradley.

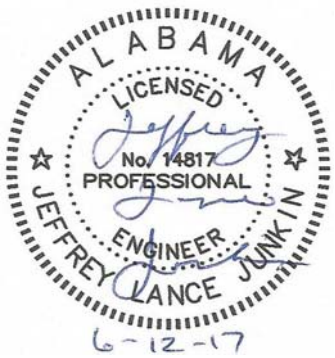
1.3 EXECUTION

A. All motor starters shall be installed by Division 26 unless an integral part of a piece of equipment.

B. Provide all power wiring to motors unless pre-wired as part of a packaged unit.

END OF SECTION 26 29 00

26 30 30 - PRIMARY ELECTRICAL DISTRIBUTION SYSTEM



SECTION 26 30 30 - ELECTRICAL TECHNICAL SPECIFICATIONS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish all labor and materials required to complete the electrical work indicated on drawings or herein specified. Major work included.

1. Arrange with University Utilities for providing such electrical and electronic services as indicated or herein specified.

2. Connect all meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches and/or other equipment forming part of the system.

3. Furnish and install complete electrical duct bank system as indicated on drawings.

4. Auburn University Facilities shall furnish and install complete new 15 KV primary cable circuits. Auburn University Facilities to furnish and install all 15 KV equipment connections.

5. Connect all electrical equipment mentioned in this section or noted on drawings.

6. Complete additions to electrical distribution system.

7. Procure and pay for permits and certificates as required by local and State ordinances and Fire Underwriters certificate of inspection.

8. Visit the site and determine conditions which affect this contract. Failure to do so will in no way relieve Contractor of his responsibility under this contract.

1.2 QUALIFICATIONS OF ELECTRICAL SUBCONTRACTOR

A. The Electrical Subcontractor shall meet the following qualifications:

1. In business as an Electrical Contractor for two (2) years prior to the date of opening bids. Employees of a General Contractor will not be acceptable for work for this Section.

2. Have a satisfactory experience record with Electrical installations of character and scope comparable with this project.

3. If Electrical Subcontractor proposes to use any other Subcontractor for any part of the work, these Subcontractors shall also meet the above qualifications before bid is acceptable.

4. If Subcontractor's office is located more than 75 miles from jobsite, he shall submit the name of a service company with a 20 mile radius of the jobsite, for approval, who will be responsible through him for service required during the warranty period.

END OF SECTION

SECTION 26 30 40 - EXTERIOR ELECTRICAL DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.1 SCOPE

A. This section includes furnishing and installing underground electrical distribution systems, complete and ready for operation.

PART 2 – UNDERGROUND ELECTRICAL DISTRIBUTION

2.1 WORKMANSHIP

A. Materials and equipment shall be installed in accordance with the approved recommendations of the manufacturer to conform to the contract documents. The installation shall be accomplished by workmen skilled in this type work.

2.2 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be as specified elsewhere herein and as shown on the drawings and shall be the products of manufacturers regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least two (2) years prior to bid opening and shall be supported by a service organization that is in the opinion of the Engineer, reasonably convenient to the site.

2.3 GROUNDING

A. Neutral conductors and non-current-carrying parts of the equipment shall be grounded. Ground conductors shall be soft-drawn copper, having a current capacity of at least 20 percent of that of the largest conductor to which it is connected, but not smaller than No. 6 AWG and not smaller than that indicated on the drawings. Ground conductor shall be connected to a copper or copper-clad-steel ground rod not less than ¾" in diameter and 10' in length as shown on the drawings.

Ground rods shall be by Penn-Union.

2.4 MANUFACTURERS DRAWINGS AND DATA

A. Within twenty (20) days after award of contract, submit six (6) copies of Manufacturer's drawings to the Architect for review of the following items. Partial submittals will be acceptable. Shop drawings of a specific item or system to be in one submittal:

(1) PVC Duct
(2) Primary Cable (By AU)
(3) Padmount Transformer (By AU)

2.5 STANDARDS OF MATERIALS

A. All materials shall be new and listed by the Underwriters Laboratories as conforming to these standards.

1. Material substitutions will be considered only when evidence of equality and suitability, satisfactory to the Architect has been presented in writing, with samples, if requested by the Architect. All proposed substitutions shall be approved in writing at least five (5) days prior to bid date.

2. It shall be understood that the Architect has the authority and may reject any material or equipment not specified or approved, or showing defects of manufacture or workmanship, before or after installation.

2.6 PROGRESS OF WORK

A. Cooperate with other crafts and schedule work as needed. Do not delay other trades. Maintain necessary competent mechanics and supervision to provide an orderly progression of the work.

2.7 WORKMANSHIP

A. All work shall be executed in a workmanlike manner and present a neat and mechanical appearance upon completion.

1. Balance load as equally as practical on all feeders and circuits.

2. Upon completion of work, test entire wiring system and show to be in perfect working order in accordance with intent of specifications and drawings. This Contractor to have all systems ready for operation and an electrician available to assist in removal of manhole covers, panel fronts etc. to permit inspection as required.

3. All work shall be in accordance with the National Electrical Safety Code, and the National Electrical Code, and the rules and regulations of the local bodies having jurisdiction.

2.8 INSURANCE

A. This Contractor to carry Workman's Compensation Insurance and Public Liability Insurance and save Owner free from damage from suits arising out of the performance of this contract.

2.9 PROTECTION OF PERSONS AND PROPERTY DURING CONSTRUCTION

A. Take all precautions, to provide safety and protection to persons and protection of materials and property as necessary, including protection from injury from rotating or moving equipment, tools, hot surfaces, holes, shafts, falling objects, electrical energy and all other potential hazards. Erect signs, barricades, and warning lights where necessary and/or directed; instruct workmen and others who may be subject to construction hazards.

1. Protect items of equipment from stains, corrosion, scratches and any other damage or dirt, whether in storage at job site or installed. No damaged or dirty equipment will be accepted.

2.10 EXCAVATION, CUTTING AND PATCHING

A. Provide cutting and patching required for this section of work. Coordinate with other trades as work progresses so cutting and patching will be minimal.

2.11 CLEANING UP

A. During the progress of the work, keep the Owner's premises in a neat and orderly condition, free from accumulation of debris resulting from this work, and at the completion of the work, remove all material, scrap, etc., not a part of the Contract.

2.12 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Turn over to Architect one set of marked "as built" drawings, one set of all equipment catalogs and maintenance data and one set of shop drawings on all equipment requiring same. Explain and demonstrate electrical systems to Owner's representative.

2.13 GUARANTEE

A. Guarantee that all work executed under this section will be free from defects of workmanship and materials for a period of one year from date of final acceptance of this work. Promptly repair, replace, or otherwise make good, upon notification, any defect becoming apparent during this period, at no charge to Owner.

2.14 TEMPORARY SYSTEMS

A. The electrical contractor shall be responsible for furnishing and installing equipment and materials necessary for providing electrical power where needed. All temporary wiring shall be installed so not to interfere with the new construction and shall be installed in a safe and approved manner.

2.15 CLEARANCE WITH UNIVERSITY

A. Before submitting a proposal, check with authorities at the University concerning points of connection with power, installation of transformers, location of service cut-in and metering, requirements as to any additional service equipment, and other details of the installation. If their requirements are at variance with these drawings or specifications and involve extra expense, these requirements shall be included in bid and the contract price shall include all costs necessary to meet those requirements without extra cost to the Owner after a Contract is entered into.

2.16 EXISTING UTILITIES

A. The Contractor shall be responsible for the safety and protection of all existing utilities within the limits of the work. It shall be his responsibility to locate and determine the depth of the existing utilities as far ahead of his operation as practicable and shall keep the Architect informed of possible vertical and horizontal conflicts. The Architect shall adjust the alignment and/or profile of the proposed facilities insofar as practically feasible to eliminate potential conflicts. Should any utilities or appurtenances be damaged by the Contractor's activities and operations under this contract, the Contractor shall cause the necessary repairs to be made and shall pay the entire cost thereof without compensation.

B. No separate compensation shall be allowed the Contractor for any work required by this paragraph nor for any delay or change in schedule resulting from necessary relocations of utilities by their owners due to conflicts with storm lines and appurtenances or as a result of grade revisions.

END OF SECTION

SECTION 26 30 50 - PRIMARY ELECTRICAL DISTRIBUTION SYSTEM

PART 1 – GENERAL

1.1 SCOPE

A. This section includes furnishing and installing the primary electrical distribution systems and manhole system, complete and ready for operation.

PART 3 – WORKMANSHIP

3.1 SCOPE

A. Materials and equipment shall be installed in accordance with the approved recommendations of the manufacturer to conform to the contract documents. The installation shall be accomplished by workmen skilled in this type work.

3.2 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be as specified elsewhere herein and as shown on the drawings and shall be products of manufacturers regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment which have been in satisfactory use at least two (2) years prior to bid opening and shall be supported by a service organization that is in the opinion of the Architect, reasonably convenient to the site. The underground duct bank design and all materials and equipment and their installations shall meet the latest applicable I.E.E.E., U.S.A.S., A.S.T.M., N.E.M.A. and ANSI C2 standards and clearances.

3.3 GROUNDING

A. Neutral conductors and non-current-carrying parts of the equipment shall be grounded. Ground conductors shall be soft-drawn copper, having a current capacity of at least 20 percent of that of the largest conductor to which it is connected, but not smaller than No. 4/0 AWG and not smaller than that indicated on the drawings. Ground conductor shall be connected to two 10 foot cooper or copper-clad-steel ground rod not less than ¾" in diameter at each primary switch and transformer and where shown on the drawings.

Ground Rods shall be by Penn-Union.

3.4 CONCRETE ENCASED DUCT BANKS

A. Concrete encased duct banks for the primary electrical distribution system shall be installed as indicated on the drawings. The number and size of the conduits shall be as indicated on the drawings. The conduits for the duct banks shall be schedule 40 PVC Duct, 90 degree C wire rated. The conduits shall be encased in concrete as indicated on the duct bank sections of the drawing. Concrete shall be 3000 psi. Duct banks shall be monolithic construction. Where a connection is made to a manhole, the concrete encasement shall be well bonded or doweled to the existing encasement. Red concrete dye shall be mixed at the top of the encasement to indicate high voltage cable.

B. All ducts connected to manholes shall be opened in manhole and identified in manholes. Identification to be attached to pull strings.

C. Duct banks shall be installed a minimum of 2'-0" below finished grade except where indicated otherwise. The Contractor shall make no deviations in the depth of the duct banks indicated on the profiles shown on the plans unless approved in writing by the Architect.

D. Conduits shall be thoroughly cleaned before using or laying. Conduit ends shall be plugged during construction.

E. The Contractor shall install duct spacers at ten (10) foot intervals to support and secure the conduits of the duct banks during the pouring of the concrete. Rebar to be installed per drawings.

F. All joints to be made with PVC solvent cement as recommended by the manufacturer of the conduit.

G. The conduits shall be by Pittsburgh, R.G. Sloan, Carlon or CertainTeed.

3.5 PRIMARY CABLE (Supplied and installed by Auburn University Facilities Management)

A. GENERAL

Primary Cable shall be single conductor shielded power cable insulated with an ozone and discharge resistant, flexible, rubber-like thermosetting dielectric. The size and number of cables shall be as indicated on the drawings. Cables shall have a voltage rating of 15,000 volts.

1. The cable in conduit shall be suitable for use in wet and dry locations in conduit, underground duct systems, direct buried and aerial installations. The cable shall be rated 90C for normal operation, 130C for emergency overload operation; and 250C for short circuit conditions. Emergency overload operation may occur for periods up to 100 hours per year and with as many as five such 100 hour periods within the lifetime of the cable.

B. BASIC CONSTRUCTION

Aluminum strand filled conductor, extruded strand screen, flexible thermosetting dielectric based on an ethylene-propylene type elastomer, extruded insulation screen, full concentric neutral, and a thermoplastic jacket overall.

C. INDUSTRY STANDARDS

1. Cable shall meet or exceed the latest editions of the following industry specifications.

ICEA S-68-516	ASTM B-8, B-231
AEIC CS-6	UL-1072 (Type MV)

D. CONDUCTOR

1. Copper. Conductors shall be Class B, stranded per ASTM B-8 and compressed.

2. Conductors shall meet the electrical resistance requirements of ICEA S-68-516, Section 2.5.2.

E. CONDUCTOR SCREEN

1. Extruded layer of semiconducting thermosetting compound with a volume resistively not in excess of 50,000 ohm-cm at 90C shall be applied as per Table I below. The compound shall have a minimum elongation after an air oven test at 121C for 168 hours of 100% and a brittleness temperature not warmer than -50 Degrees C.

2. The screen shall be clean stripping from the conductor and firmly bonded to the overlying insulation.

F. TABLE I

Table I

Conductor Size AWG/MCM	Thickness Mils Minimum Average
8 - 4/0	15
250 - 500	20

G. INSULATION

1. The insulation shall be ethylene-propylene. It shall meet the electrical and physical characteristics specified in the Physical and Electrical Characteristics of the Dielectric paragraph of this cable specifications.

2. The average insulation thickness shall be not less than shown in Table II below. The minimum thickness at any cross-section of the insulation shall be not less than 90% of the average thickness.

3. The ethylene-propylene insulation shall be triple-tandem extruded with the conductor and insulation screens.

H. TABLE II

Table II

Rated Voltage Phase to Phase kV	Conductor Size AWG/MCM	Minimum Average Insulation Thickness mils 133%	5 minute ac Withstand kV 133%	15 minute dc Withstand kV133%
15	#2 to 500 MCM	220	44	80

I. INSULATION SCREEN

1. The insulation screen shall be an extruded semiconducting compound with a volume resistively not in excess of 50,000 ohm-cm at 90C when tested per AEIC No. CS-6.

2. Peel strength of the extruded screen from insulation shall be between 6-18 lbs./0.5 inch width when tested per AEIC No. CS-6. This compound shall have a minimum elongation after an air

   oven test at 121C for 168 hours of 100% and a brittleness temperature not warmer than -50 Degrees C.

3. The thickness of the extruded screen shall be as follows:

Dia. Over Insulation Inches	Insulation Screen-Thickness (mils) Minimum Average
0 - 1.000	30
1.001 - 1.500	40

4. The outer surface of the insulation screen shall be printed with yellow or white ink - "Semiconducting Remove When Splicing or Terminating."

J. TAPE SHIELD

1. A copper tape shield shall be utilized.

K. JACKET

1. The overall jacket shall be black polyvinyl-chloride and shall meet the requirements shown in Physical Characteristics of Polyvinyl chloride Jacket paragraph of this cable specification.

2. The jacket thickness shall be as shown in Table III below.

Table III

Cable Core Diameter (Inches)	Jacket Thickness Minimum Average/Mils
0 – 0.425	45
0.426 – 0.700	60
0.701 – 1.500	80
1.501 – 2.500	110
2.501 & Larger	140

3. The minimum thickness at any point shall be not less than 80% of the specified minimum average thickness.

L. IDENTIFICATION

1. A permanent marker indicating "manufacturer's name, year of manufacture, and sequential footage number" repeated each foot shall be inserted under the copper shielding tape.

2. An identifying legend shall be printed on the jacket with contrasting ink and shall be repeated approximately every two feet. It shall contain the following information:

a. Manufacturer's Name, Plant (N) Shielded Ethylene-Propylene (T) Mils (W) AWG/MCM Copper (Y) V (Z)
b. Insert Plant Number for (N), insulation thickness (T), Conductor Size (W), copper or aluminum (X), rated voltage (Y), year of manufacture (Z).
c.

M. COMPLETE CABLE TEST

1. All final tests on completed cable shall be performed on factory master lengths.

2. Electrical Test

Conductor Resistance, max.	Para. 4b
AC Withstand, 5 minutes, kV	Table II
IR Constant at 15.6 degree C, min.	50,000 megohms-1000 ft.
DC Withstand, 15 minutes, kV	Table II
Corona Level	AEIC CS6, Table F1
Shield Resistance, ohms	Record End-to-End

3. Sample Tests

Short samples of the completed cable shall be checked for:

a. Dimension and construction requirements of AEIC CS6.

b. The outer screen shall meet peel strength and conductivity limits of Paragraph 9.

c. The insulation and jacket shall meet the guaranteed value listed in this specification. Physical requirements before aging shall be checked at least once regardless of quantity of cable produced.

N. PHYSICAL AND ELECTRICAL CHARACTERISTICS OF THE DIELECTRIC

When samples from completed cable are tested in accordance with the ICEA Specification, the vulcanized insulation shall meet the following guaranteed values:

	Guaranteed Value
1. Physical Requirements - Unaged	
Tensile Strength, psi, min. at room temp.	900
Elongation, % min. at room temperature	250
200% Modulus, psi, min. at room temperature	600
100% Modulus, min. psi @ 130C	200
2. Aging Requirements	
After Air Oven Test for 168 hours at 150C	
Tensile Strength, % of unaged, min.	75
Elongation, % of unaged, min.	60

3.	Ozone Resistance	
	After 24 hours at 0.025 to 0.030%	No Cracks
4.	Electrical Characteristics at Room Temp. (15.6C)	
	SIC at 80 V/mil, maximum	3.0
	% Power Factor at 80 V/mil, maximum	1.0
	Insulation Resistance Constant (K), minimum	50,000
5.	Electrical Characteristics at 90C	
	After 24 hours water immersion at 90C	
	Dielectric Constant, SIC, 80 V/mil, max.	3.0
	Power Factor, PF%, 80 V/mil, max.	1.5
	After 26 weeks water immersion at 90C	
	Dielectric Constant, SIC, 80 V/mil, max.	3.1
	Power Factor, PF%, 80 V/mil, max.	1.5
	Stability Factor, (PF at 80-40 V/mil) max.	0.2
6.	Mechanical Water Absorption (UL-44)	
	7 Days at 82C, mg/sq. in., max.	5.0
7.	Heat Distortion	
	Buffed samples of insulation taken close to conductor screen. Maximum %.	10.0

O. PHYSICAL CHARACTERISTICS OF POLYVINYL CHLORIDE JACKET

When tested in accordance with the ICEA specification the jacket shall meet the following guaranteed values:

		Guaranteed Value
1.	Physical Requirements - Unaged	
	ASTM D-142, Die C	
	Tensile Strength, psi, minimum	1500
	Elongation at Rupture, % minimum	100
2.	Aging Requirements	
	Air Oven Test at 100C for 5 days	
	Tensile Strength, % of unaged value	85
	longation, % of unaged value	
3.	Oil Immersion Requirements	
	In ASTM #2 Oil at 70C for 4 hours	
	Tensile Strength, % of unaged value	80
	Elongation, % of unaged value	60
4.	Heat Distortion	
	After 1 hour in air oven at 121C, % maximum	50

5. Heat Shock
   After 1 hour in air oven at 121C — No Cracks

6. Cold Bend
   After 20 hours at -35C — No Cracks

P. MANUFACTURER

1. The primary cable in conduit shall be by The Okonite Company, Perilli, General or Keywright. Cables by other manufacturers which meet this specification may be proposed for use; however, a sample of the proposed cable must be submitted to the Engineer for approval. The proposed cable must be approved by the Engineer or the Contractor shall furnish and install the cable specified.

R. CABLE INSTALLATION

1. Cables shall be pulled no farther than from one manhole to the next manhole. Splices shall be installed in all manholes for cable runs which pass through a manhole without going to a primary switch or transformer.

2. After the installation, the primary cable shall be given a high potential test. The Engineer shall approve an independent "NETA" certified testing firm and the Contractor shall be responsible for and shall pay the costs of the initial test for all cables. Should any installed cable fail the tests, the Contractor shall replace all cables in the duct with the subject cable or shall correct the problem to the satisfaction of the Engineer. The Engineer shall have the option and shall decide if the problem shall be corrected or if the cables shall be replaced. The Contractor shall pay for the costs of all re-tests necessary due to a cable failing the initial test.

3. The method, voltage, length of time, and other characteristics of the tests shall be in accordance with IPCEA Publishing No. S-19-81, latest edition, for the particular cable installed. The independent testing firm employed by the Contractor registered professional engineer, for each cable tested stating weather the cable passed the test and is acceptable or the cable failed the test and is not acceptable. Such professional opinion shall be the sole basis for deciding if the installed cable passed the test and is acceptable.

4. After duct has been concrete encased and backfilling is complete, all ducts must be certified as follows:

   a. A wire brush shall be pulled through each conduit. The brush shall be of sufficient size to thoroughly clean conduit of debris.

   b. A cloth swab shall be pulled through each conduit. The swab shall be of sufficient size to clean all foreign matter out of conduit. Swab shall be pulled enough times to completely clean conduit.

   c. A mandrel shall be pulled through each conduit to ensure no duct has collapsed.

   d. Each duct run shall have a exact measurement of the length of duct run and written certification shall be kept on each conduit run.

e. The procedure shall be to pull

1) Wire Brush

2) Cloth Swab

3) Mandrel

4) Length Measurement

5) 1 Ply Polypro Line Pull Rope In All Conduits Installed

a) The Auburn University Maintenance Personnel shall be responsible for keeping duct certification log and be on site as ducts are certified.

b) All wire brushes, cloth swabs, and mandrels shall be submitted to Engineer for approval prior to work beginning.

c) After all cable installation is complete and spare pull lines have been installed, all ducts shall be sealed.

3.6 CABLE CONNECTIONS (Furnished and installed by Auburn University Facilities Management)

A. TERMINATIONS

1. Cable terminations and splices shall have voltage ratings of not less than 15,000 volts. The standard withstand voltage of the completed terminations shall conform to IEEE Standard No. 48. Modular terminators or tee splices as indicated shall be provided at the terminals of all shielded cable.

2. Terminators for overhead risers shall be porcelain type by Joslyn or equal.

3. Modular terminators for outdoor installations shall be Elastimold 35MTG Modular Terminators complete with all required accessories for a complete termination.

4. Modular terminators for indoor terminations shall be Elastimold 35MTG Modular Terminators complete with all required accessories for a complete termination.

5. All cable terminations shall have 3M Shield Adapter Kit #8400 with long series strap braided ground with grounding wire attached.

6. Terminators for risers in the substation shall be porcelain type by Joslyn or equal.

B. CABLE ELBOWS

1. 600 Amp elbows with 600 Amp reducing tap well with 200 Amp bushing insert by Elastimold.

2. Elbow Arrestors to be on all elbows as above by Elastimold.

3. The Contractor to provide elbow arrestors for this project as called for on detail drawings by Elastimold.

C. CABLE SPLICES

1. Splices to be Perrilli Elaspeed inline splices. All cable shall be spliced by AU Facilities at each manhold on all Through manhole cables.

2. "T" splices to be installed where indicated on the drawings by Elastimold.

D. Cable terminator, splices and elbows may be provided by Cooper when submitted to Engineer for approval five (5) days prior to bid date.

3.7 PADMOUNTED TRANSFORMER (Furnished and installed by Auburn University Facilities Management)

A. DESCRIPTION

1. 65 Degrees C rise Pad-mounted Transformer, three-phase, OISC, compartmental, type, 60 hz, HV loop-feed, dead-front type conforming with ANSI C57.12.26-1987.

B. ELECTRICAL

1. High Voltage: 12,470 Grd Y-7200 volts (95kv BIL)

2. Low Voltage: As specified, 480 Grd Y/277 or 208 Grd Y/120 volt 3-phase, 4 w Y

3. Impedance: Per latest ANSI standard (must be stated in bidder's quotation)

4. Taps: HV – Std. 2-2 ½% above and 2-2 ½% below externally operable, non-loadbreak

5. Connections: HV loop feed (loop-in loop-out)

6. Core/Coil Configuration: The core and coil assembly shall be wound core type with copper or aluminum windings. The assembly shall be designed to reduce losses and noise and provide adequate short-circuit strength and heat dissipation. Manufacturer shall design transformers such that tank heating problems sometimes associated with wye-wye connections are eliminated. Internal leads shall be insulated, carefully trained and anchored to prevent phase-to-phase flashover. A tap changing mechanism shall be provided for accurate voltage adjustment without opening the transformer tank. The tap changing mechanism shall be externally operated and shall be for de-energized operation only. The high and low voltage compartments shall be located side-by-side separated by a steel barrier. When facing the transformer, the low voltage compartment shall be on the right. Terminal compartments shall be full height, air filled with individual doors. The high voltage door fastenings shall not be accessible until the low voltage door has been opened. The low voltage door shall have a 3-point latching mechanism with vault type handle having provisions for a single padlock. The doors shall be equipped with lift-off type stainless steel hinges and door stops to hold the doors open when working in the compartments.

7. Fusing: HV Bay-O-Net Fuse (Current-Sensing Fuse) in series with internal ELSP current back-up fuse; one per phase (coordinated to provide full range protection up to 50,000A)

C. MECHANICAL

1. HV Bushing: 2 loadbreak 200 AMP epoxy bushings per phase, per ANSI C57.12.26, interfaces with 200A Load-break, 15 kV, Elbows. Total of (6) bushing wells, (6) bushing inserts, (6) parking stands. Elbows furnished by others.

2. LV Busing: 4 epoxy bushings with **minimum 8**-hole NEMA tin-plated CU spades; externally removable tank ground strap to Xo bushing, per ANSI C57.12.26. Figs. 7 & 8 (a**). Provide additional insulated supports for each secondary spade.**

3. Enclosure: Steel sealed-tank construction (+7.0 psig withstand strength), tamper resistant, lift-off doors with stainless steel hardware and captive locking provisions, steel barrier between HV & LV compartment, removable sill, lifting eyes and jacking pads will be provided, undercoated and painted.

Primary compartment shall be a minimum of 36” width X 18” depth, secondary compartment shall be a minimum of 23” width X 18” depth. Top of primary and secondary compartment to have a hinged top.

Minimum height to centerline of lowest primary bushing 26” and secondary bushing 31” minimum.

Enclosure Finish Performance requirements for the padmonted gear coating shall meet all requirements in IEEE Std. C57.12.28 - 2014 Standard to include the following testing:

Salt Spray
Crosshatch adhesion
Humidity
Impact
Oil resistant
Ultraviolet accelerated weathering
Abrasion resistance – tabar abraser

Paint shall be 3 mills thick minimum, "Auburn Bronze" by Matthews Paint (MAP 37092 Deep Bronze). Paint color formula can be provided on request. Bidder shall submit test results and three 4" x 6" metal color samples with shop drawing submittal prior to fabrication.

4. Accessories:

   a. 1" Oil drain valve with sampling device (**installed in HV Primary compartment, not LV secondary side)**

   b. 1" Upper filter press and filling plug

   c. Liquid level gauge

   d. Dial type thermometer

   e. Pressure/vacuum gauge and pressure relief valve

   f. Nameplate in low-voltage compartment and additional Nameplate on backside of secondary cabinet (outside).

5. Lightning Arresters: Furnish (3) external 9 KV M.O.V. with interface to loadbreak epoxy bushings, and stranded ground wire.

6. Grounding Pads: Provide two-hole grounded pads in both high and low voltage compartments. Two ½" dia. threaded holes in each, stainless steel.

7. Transformers shall be furnished with:

   a. Impedance in percent

   b. Guaranteed no-load and load losses, expressed Watts at rated voltage and full load at 60 Hertz, corrected to 85 degrees C, per the latest revision of ANSI C57.12.00 par 8.1.1.

c. Dimensional data including the high and low voltage compartment dimensions (width, height, and depth) and the total weight of the shipped unit.

d. Insulating Oil shall be FR3 Fluid, as manufactured by Cooper and shall be tested and certified in writing and a letter accompanying the unit as written below:

> The dielectric fluid in this unit, serial number _____ has been tested to determine the amount of polychlorinated bipheny(s) PCB content. Manufacturer certifies that based on the test sample, the fluid contains less than 5 ppm PCB and is therefore classified a non-PCB as defined in the August 25, 1982, Vol. 47 No. 165 of the Federal Register.

e. Unit shall be labeled with a non-PCB sticker, conspicuously located to facilitate the inspection by the regulatory compliance officer or any other individual desiring to inspect such equipment.

8. Manufacturer shall provide complete submittal drawings for this equipment, along with color samples as required in this specification, for Owner's review and approval, prior to manufacturing this equipment.

   Manufacturer to provide Operating and Maintenance Manual (with each transformer), which shall include diagrams, part listing, operating instructions, and preventative maintenance recommendations.

   Approved manufacturers are: Square "D", Howard Industries, A.B.B., Cooper (RTE), ERMCo, and CG Power.

C. LOSS EVALUATION

1. The following information shall be furnished with the bid: Percent impedance at 85 degrees C, No-load losses expressed in watts at rated voltage at 60 Hz, and Full load losses expressed in watts at rated voltage at 60 Hz.

   The losses quoted shall be average losses experienced on the production line.

   A computer generated certified test report listing impedance and actual losses for each unit by serial number shall be supplied in triplicate.

   Invoice will not be approved for payment until the certified test reports are received and approved.

   All losses shall be determined in accordance with the latest revision of ANSI C57.12.00 - 1973 paragraph 8.1.1 corrected to 85 degrees C.

   NOTE: Failure of the bidder to supply the above information may result in rejection of bid.

2. Loss evaluation will be a factor in determining the low bidder. The following actors will be used to perform loss evaluation on the transformers:

a. No load losses will be evaluated at $6.00 Per watt.

b. Load losses will be evaluated at $2.00 Per watt.

Total owning cost will be the sum of the bid price and the evaluated cost.

3. If the average losses of the order of transformers exceeds the guaranteed losses, a penalty will be assessed as determined by the following:

   Penalty = 1.1 [($6.00/watt) (excess no load losses)+
   ($2.00/watt) (excess load losses)]

4. Bonuses for losses less than guaranteed will not be provided.

3.9 METERING

A. Owner to furnish meter test block and connect to CT's and PT's. Auburn University will furnish and install CT's, PT's and meter on 277/480V and 120/208V transformers.

END OF SECTION

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide lighting fixtures complete with all lamps as specified on the Electrical, Architectural, Interior and Lighting Designer Drawings. Provide all supports, brackets, connectors, materials, tools, wiring, controls and labor to provide a complete and operating lighting system.

B. All blemished, damaged or unsatisfactory fixtures shall be replaced in a satisfactory manner as directed by the Architect.

C. Where a fixture type designated has been omitted, cannot be determined or is in conflict with other Drawings or Specifications, request a clarification from the Architect, prior to bid, and provide suitable fixture type as directed.

D. All lamps shall be operating at project completion and for a period of six (6) months after the final acceptance by the Owner.

E. Confirm exact locations of lighting fixtures with the Architectural Reflected Ceiling Plan and mechanical equipment above or on the ceiling.

F. All recessed lighting fixtures shall match the ceiling type and be tested and certified by the fixture manufacturer for the type of mounting.

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle lighting fixtures carefully to prevent breakage, denting and scoring the fixture finish. Do not install damaged lighting fixtures; replace and return damaged units to equipment Manufacturer.

B. Store lighting fixtures in clean, dry space. Store in original cartons and protect from dirt, physical damage, weather and construction traffic.

1.3 SUBMITTALS

A. The following submittal data shall be furnished according to Section 01 33 00 and Section 26 01 00 and shall include but not be limited to:
   1. Lighting fixtures complete with physical dimensions, materials, connector details, voltage, current, installation details, air handling capability, etc.
   2. Lamps complete with base or pin configuration, lumen rating, life expectancy, color temperature, starting characteristics, etc.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Base bid lighting fixtures shall be based on manufacturer and descriptions listed. Alternate fixture manufacturers not specified and proposed by the Contractor shall be submitted for approval prior to base bid.

B. Fixtures are designated on the Drawings by “type” as indicated by a letter that corresponds to a lighting fixture description and specification on the lighting fixture schedule.

C. Each lighting fixture shall comply with NEC Article 410, Energy Independence & Security Act, local codes and the authority having jurisdiction.

D. Provide a lighting fixture complete with lamps, ballasts and required accessories for each lighting fixture shown. Provide all mounting and trim hardware to suit the specific installation and location.

E. All lighting fixtures shall bear a U.L. label.

F. Where fixtures are specified with acrylic lens, provide virgin acrylic with 0.125 inch thickness.

G. Exit lighting fixtures shall meet the requirements of all federal, state and local codes.

2.2 LAMPS

A. All lamps shall be as specified on the Lighting Fixture Schedule.

B. Fluorescent lamps in general shall be T8, 48-inch length with initial lumens of 2,950 at 32 watts and an average life of 20,000 hours. If a color is not designated on the Drawings, then provide 3500K color lamps. Ballast and lamps shall be compatible.

C. Acceptable manufacturers are General Electric, Osram-Sylvania or Philips.

2.3 LAMP HOLDERS

A. For incandescent, provide porcelain body and nickel-plated brass socket, prelubricated with silicone compound.

B. For fluorescent, provide white urea plastic body and silver-plated phosphor bronze or beryllium copper contacts. Fluorescent lamp sockets with open-circuit voltage over 300 volts shall be safety type and designed to open circuit when lamp is removed.

C. For compact fluorescent lamps, provide molded thermoplastic body with copper alloy contacts and stainless steel retainer clips. Provide pin configuration to match lamps.

D. For high intensity discharge, provide porcelain body and nickel-plated brass socket, prelubricated with silicone compound. Medium base sockets shall be 4 KV pulse rated.

2.4 BALLASTS

A. General
1. All ballasts shall be UL listed and CBM certified. Ballasts shall be CSA certified where applicable.
2. Ballast shall be approved for operating with specified lamp. Ballast shall provide normal rated lamp life as stated by acceptable lamp manufacturer.
3. Ballast shall be suitable to operate on the voltage system they are connected to and maintain correct lamp operation with 10% fluctuation of rated input voltage with no damage to ballasts or lamps.
4. Ballast shall have the lowest sound rating available for the lamps specified. Replace noisy ballasts as directed by Engineer at no cost to the Owner.
5. Ballast shall contain no PCBs.
6. Ballasts shall be identical within each fixture type. All ballasts within the same luminaire shall be from the same manufacturer.

7. Ballast shall support a sustained short to ground on open circuit of any output leads without damage to the ballast and without blowing fuses either inside the ballast or in line with the ballast.
8. Ballast shall be suitable to operate in:
   a. Indoor heated or air conditioned spaces: 50ºF to 150ºF ambient.
   b. Outdoor or in unheated spaces: 0ºF to 105ºF.
   c. Un-air-conditioned spaces: 50ºF to 150ºF at rated life in pendant mounted industrial type fixture.
   d. Recess mounted fixtures: in maximum 140ºF ceiling cavity.
   e. With fire-rated covering, clear air space between fixture and covering minimum of 3 inches.
9. Ballast for T-4 and T-5 lamps shall have lamp fault interrupter for end of life failure.
10. Manufacturer shall have been manufacturing ballasts for at least 5 years.

B. Fluorescent Ballast
1. Ballast shall be high frequency and operate lamps at a frequency above 25 KHz with less than 2% lamp flicker.
2. Provide rapid start 0.99 power factor ballast, except as noted, with required voltage and frequency.
3. Ballast shall be UL listed Class P with integral resetting thermal protector, and be suitable for use indoor or Type 1 outdoor application.
4. Ballast case temperature shall not exceed 90ºC.
5. Ballast shall have a ballast factor of greater than .875.
6. Ballast shall comply with Federal Communications Commission Part 18C limits for electromagnetic interference and radio frequency interference for non-consumer equipment.
7. Ballast shall provide transient immunity as specified by ANSI C62.41, Category A (formerly IEEE 587, Section B).
8. Ballast shall have lamp current crest factor of less than 1.7.
9. Total harmonics distortion shall be less than 10%.
10. Third harmonic distortion shall be less than 6%.
11. Ballast shall internally limit in-rush current to not exceed 30 times normal operating current for duration of 5 milliseconds.
12. Manufacturer shall provide 5 year written warranty against defects in material or workmanship, including replacement labor cost.
13. Acceptable manufacturers are Magnetek, Motorola, Osram/Sylvania and Advance.

C. T-8 Electronic Fluorescent Dimming Ballast
1. Ballast shall meet criteria for electronic fluorescent ballasts. See above.
2. Smooth continuous dimming range from 100%-1%.
3. Power factor greater than .90.
4. Total harmonic distortion less than 20%.
5. No visible lamp flicker over entire dimming range.
6. Ballast shall be capable of striking lamps at any light level without first flashing to 100% output.
7. Ballast shall be UL listed for operating specified lamps.
8. Ballast shall be inaudible over entire dimming range.
9. Acceptable manufacturer is Lutron.

D. T-4 and T-5 Compact Fluorescent Electronic Dimming Ballast
1. Ballast shall meet criteria for electronic fluorescent ballasts. See above.
2. Smooth continuous dimming range from 100%-5%.
3. Power factor greater than .90.
4. Total harmonic distortion less than 20%.
5. No visible lamp flicker over entire dimming range.

6. Ballast shall be capable of striking lamps at any light level without first flashing to 100% light output.
7. Ballast shall be UL listed for operating specified lamps.
8. Ballast shall be inaudible over entire dimming range.
9. Acceptable manufacturer is Lutron.

E. High Intensity Discharge
1. Provide constant wattage autotransformer (CWA) or high reactance autotransformer high power factor (HX-HPF) type ballast with power factor greater than .90 except as noted.
2. Ballast shall be designed with Class N insulation.
3. Drop out voltage shall be not less than 70% of nominal.
4. For indoor commercial application:
   a. Provide NEMA rated AA@ sound rating.
   b. Ballast shall comply with Federal Communications Commission Part 18C limits for electromagnetic interference and radio frequency interference.
   c. Ballast shall provide immunity as specified by ANSI C82-4.
5. Acceptable manufacturers are Magnetek, Osram/Sylvania, Advance, and Valmont.

2.5 EMERGENCY BATTERY LIGHTING

A. Lighting fixtures indicated on the drawings to be provided with an emergency battery ballast shall provide emergency lighting by using standard fluorescent lamp or lamps and an emergency battery ballast. The ballast shall consist of a field replaceable high temperature, maintenance free nickel cadmium battery, charger and electronic circuitry contained in one metal case. Provide a solid state charging indicator light to monitor the charger and battery, double pole test switch and installation hardware. The battery ballast shall provide power to the fluorescent lamp upon failure of the normal supply to the fixture.

B. The test button and indicator light shall be integral in the fixture reflector and shall be positioned within or on the surface of the fixture so as to be accessible and identifiable.

C. Under normal mode the battery ballast shall keep the batteries at full charge. Upon loss of normal power the battery ballast shall operate the fluorescent lamp or lamps for 90 minutes.

D. Battery recharge time shall not exceed 16 hours to fully recharge and shall not exceed 225 milliamperes charging current.

E. The lumen output of the lamp or lamps powered by battery unit shall be not less than 1100 lumens initially for a four foot fluorescent lamp.

F. The battery ballast shall meet or exceed all the requirements set forth in UL924 “Emergency Lighting and Power Equipment” and shall be UL listed for installation on top of or remote from the fixture. Emergency illumination shall meet or exceed the requirements set forth in the National Electric Code, Life Safety Code and UL 90-Minute Requirements.

PART 3 - EXECUTION

3.1 GENERAL

A. Locations on the Drawings are diagrammatic. Verify exact locations with Architectural Reflected Ceiling Plans and coordinate space conditions with other trades.

B. Modify locations in mechanical equipment rooms to suit the conditions of the mechanical equipment while maintaining a sufficient and uniform lighting level equal to that provided by the layout shown on the Drawings.

C. Fixtures of the same type and in the same ceiling shall have lamps, socket assembling and door hinges oriented in the same direction.

D. Reflector cones, baffles, aperture plates, light controlling element for air handling fixtures and decorative elements shall be installed after completion of ceiling tiles, painting and general cleanup.

E. Target and focus adjustable lighting fixtures after regular working hours and before building acceptance. Permanently indicate targeting on fixture and provide positive locking devices to preclude mis-focus relamping. Target and focus in the presence of the Architect and Lighting Designer.

F. Relamp all incandescent and low-voltage fixtures immediately prior to Owner's acceptance of building. Replace non-operating, damaged or darkened fluorescent and high intensity discharge lamps immediately to Owner's acceptance of building.

G. Clean all fixture reflectors, lenses, louver, decorative accessories and lamps immediately prior to Owner's acceptance of building. Destaticize plastic lenses and diffusers after cleaning.

H. Lighting fixtures mounted within, under, on or integral with millwork shall be given special consideration. Fixture counting and sizes shall be coordinated with the applicable space and adjusted accordingly. This coordination shall occur prior to ordering fixtures. Refer to Architectural Drawings for details.

3.2 SUPPORT OF LIGHT FIXTURES

A. Support directly from building structure, any lighting fixture which weighs in excess of the capacity of the suspended ceiling on which it is installed. Support each such fixture with the quantity of threaded rods or fixture support wires required to prevent fixture warping; however provide no less than two rods or wire per fixture.

B. Outlets, which are recessed in a suspended ceiling and support the weight of surface-mounted or suspended fixtures, shall be supported from a channel spanning and secured to the ceiling support system. Support each end of the channel with a fixture support wire attached to structure.

C. Installation in grid-type suspended ceiling:
1. Support each fixture at opposite corners, in which a lay-in fixture is located, with a fixture support wire attached to structure to comply with NEC Art 410 independent of any support provided from suspended ceiling grid. Provide a support clip, securely fastened to the ceiling grid, at or near each corner of each lay-in fixture.
2. Support fixtures, which are smaller than the ceiling grid opening and which are recessed in the acoustical panel, with at least two metal channels spanning, and secured to, the ceiling grid. Support each end of each channel or each corner of the grid opening with a fixture support wire attached to structure. Do not support fixtures by ceiling acoustical panels.

D. Provide additional supports as required by local codes and seismic zone.

END OF SECTION 26 50 00

SECTION 28 13 00 - ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers the access control systems, including initiating devices, notification appliances, controls, and supervisory devices.

B. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the access control system as indicated on the drawings and specifications.

C. The Access Control System shall consist of all necessary hardware equipment and software programming to perform the following functions.

1. Security system operations.
2. Access control of monitored doors.
3. Supervision of door position switches.
4. Supervision of detection devices.
5. Reporting to campus central monitoring station.

D. Provide system complete with all hardware, branch circuits, conduit, installation material, wiring, and labor required for a complete operating system conforming to the intent of the drawings and these specifications. Although specific mounting locations, wire and cable runs, and conduit routing have been identified on the Security Device Drawings, the Drawings are not to be considered as all-inclusive and the contractor shall provide and install any component necessary for a completely operating system.

1.2 SYSTEM DESCRIPTION

A. The Access Control System (ACS) shall be designed to support advanced distributed network architecture. The Intelligent System Controllers (ISC) shall be wired to any Windows based PC that is licensed to run the ACS software. In addition, Intelligent System Controllers shall be connected to the university LAN or WAN via industry standard TCPIP communication protocol. Network based Intelligent System Controllers shall be able to communicate back with the database server through network switches and routers and shall not have to be on the same subnet. The ACS shall also support dual path upstream communications between the field hardware and client workstations database server. Secondary communications paths shall include direct connection (RS-232), network (TCPIP) or dial up connections. As such, any alarm in the ACS shall be capable of being routed to any client workstation(s) on the network, regardless of the Controller that generated the alarm. The ACS system shall consist of a fully automated and integrated computer-based card access control system.

B. The contractor shall refer to the security drawings for general locations and requirements for the installation of security devices. All panel boxes, back boxes, junction boxes, and power supply cabinets shall be located within the secured areas of the building.

C. The ACS shall be installed in accordance with all applicable national, state and local codes including, but not limited to, the most recent editions (as adopted) of the following:

1. BICSI 569 standard wiring practices
2. National Electrical Code Articles 300, 700, and 800

3. National Fire Protection Association Life Safety Code (NFPA 101)
4. Building Officials & Code Administrators International, Inc. (BOCA)
5. Underwriters Laboratories (UL 294, 1076, 1037)
6. International Building Code (IBC)

1.3 CONTRACTOR REQUIREMENTS.

A. The contractor is required to visit the site and fully inform himself concerning all conditions affecting the scope of the work. Failure to visit the site shall not relieve the contractor from any responsibility in the performance of this contract.

B. The system contractor must have 5 years of experience and have maintained a service department within 2 ½ hours drive of the university. The ACS installer shall be factory certified by the equipment manufacturer. The contractor must be able a resume of similar projects installed over the past 2 years and shall provide certification credentials of service technicians

C. The University will provide a dedicated TCP IP network to support the security solution. The contractor shall verify and coordinate with the University to ensure that this communication path is available and operational prior to the beginning of installation.

D. The contractor shall provide all system programming of the ACS. of the main panel, network interface device, card access database, time zones and schedules, access codes, and zone names. The contractor will base the program on the approved submittals provided by the contractor, approved by the University. The contractor is required to program any field devices, access portals and associated alarm indicators, and floor plan based mapping as required in the conversion of an existing system where applicable.

PART 2 - PRODUCTS

2.1 MAIN SECURITY PANEL COMPONENTS

A. The ACS equipment shall be the Lenel On Guard Series manufactured by Lenel Systems which is the university standard for connection to the existing campus wide system. No other manufacturers are allowed. The university will provide system licenses to connect to the existing systems

B. Field Hardware j Systems Controllers

1. Depending upon the configuration, the ACS field hardware must be able to include any or all of the following components: Intelligent System Controller (ISC) Lenel 3300 Input Control Module (ICM) Lenel 1100 Output Control Module (OCM) Lenel 1200 Card Readers and Keypads Lenel XF series proximity Indersol Rand and Von Duprin Door Hardware Dual Reader Interface Module (DRI) Lenel 1320 Panel Power Supplies Lenel AL6000ULX-4BC, AL400ULX Star Configuration Splitters Lenel 8000 NetShelter Communications System Enclosure Magnetic Door Contact Switch; GE-1078, or equal Dual-Technology Motion Detector; Honeywell DT-6360 STC, or equal Glass-Break Detector; Honeywell FG-730, or equal Hard-Wired Panic Alarm Button; GE 3040CTW, or equal Interface to CCTV Surveillance System; as provided in Section 28 1300 Video Management Local Door Sounder; GE MPI-47, or equal CCTV: Genetec OmniCast Enterprise

C. Lenel 3300: Intelligent System Controller (ISC)

1. An Intelligent System Controller (ISC) shall link the ACS Software to all other field hardware components (Card Readers, Keypads, Intrusion Detection Panels, Output and Input Control Modules). The ISC shall provide full distributed processing of access control & alarm monitoring operations. Access levels, hardware configurations, and programmed alarm outputs assigned at the administration client workstation shall be downloaded to the ISC, which shall store this information and function using its high speed, local 32-bit microprocessor.

2. All access granted/denied and arm/disarm decisions must be made at the ISC to provide fast responses to card reader and keypad transactions. A fully configured ISC with 64 card readers shall require less than one-half (0.5) seconds to grant access to an authorized cardholder or deny access to an unauthorized cardholder.

3. The system access control field hardware shall provide a network based ISC. The network ISC shall be a 10 MB Ethernet based panel that has the capability to reside on a local area network (LAN) or wide area network (WAN) without connectivity to a PC serial port.

4. Network based intelligent system controllers shall be able to communicate back with the database server through industry standard switches and routers and shall not have to be on the same subnet.

5. The ISC is required to continue to function normally (stand-alone) in the event that it loses communication with the system software. While in this off-line state, the ISC is required to make access granted//denied, arm/disarm decisions, and maintain a log of the events that have occurred. Events shall be stored in local memory, and then uploaded automatically to the system database after communication has been restored.

6. The ISC must contain the following features: UL 294, ULC, and CE Certified Support for Host Communications Speed of 115,200 bps Support for Direct Connect, Remote Dial Up, or Local Area Network (LAN) Connection Support for Dual Path Host Communications -Secondary Path shall be Direct Connect, Local Area Network (LAN) Connection, or Remote Dial up Connection. Support for 16 MB of On-Board Memory, 16 MB is required when use of card readers is present LAN Support shall utilize RJ45 (10j100baseT) Ethernet Interface Flash Memory for real time program updates and overall host communications Support for four 2 wire downstream ports Memory storage of up to 5,000 cardholdersj100,000 events, with memory expansion of up to 350,000 cardholdersj1,000,000 events Base ISC with standard memory download from the system shall require no more than ten (10) minutes Downstream ports shall be for connecting card readers and data gathering panels via RS-485 multi-drop wiring configuration Support for up to 32 devices consisting of Reader Interface Modules, Input Control Modules, and Output Control Modules in any combination desired with a maximum of 16 ICMs per ISC Support of multiple card technologies Supervised Communications between ISC and System Software Multi - drop support for up to eight ISCs per system communications port Support of up to eight card formats and facility codes RS-485 Full Duplex, UL 1076 Grade AA communication channel to the system head-end. Integration to other manufacturer's card readers Uninterruptible Power Supply (UPS) with battery backup 32-bit Microprocessor An ISC downstream serial port shall multi-drop 16-access control field hardware devices using an RS-485 UL 1076 Grade A communication format

allowing a distance of 4,000 feet using Belden 9842 cable. 12 VAC or 12 VDC input power Issue Code Support for Magnetic Stripe Formats Individual Shunt Times (ADA Requirement) Up to Nine Digit PIN Codes Downstream serial RS-232 device support Status LEDs for normal component and communication status

D. Lenel 1100: Input Control Module (ICM):

1. The Input Control Module shall monitor all system alarm inputs.

2. Grade A Inputs:

   a. The input control module shall provide up to 16 UL 1076 Grade A analog supervised alarm input zones to monitor and report line fault conditions (open, short, ground, or circuit fault), alarm conditions, power faults and tampers. When an alarm input is activated, the associated alarm condition shall be reported to both the ISC and subsequently to the system alarm monitoring client workstation. Status LEDs shall provide information about the sixteen-alarm zone inputs, cabinet tamper, and power fault. For each status LED, a slow flash shall imply a "No Alarm" condition and a fast flash shall indicate an alarm condition, and a solid LED shall indicate a "Zone Fault" (open, short, ground, or circuit fault).

3. Grade AA Inputs:

   a. The Input Control Module shall provide up to 16 UL 1076 Grade AA alarm input zones to monitor and report line fault conditions, alarm conditions, power faults and tampers. When an alarm input is activated, the associated alarm condition shall be reported to both the ISC and subsequently to a system alarm monitoring client workstation. Status LEDs shall provide information about the sixteen-alarm zone inputs, cabinet tamper, and power fault. For each status LED, a slow flash shall imply a "No Alarm" condition, a fast flash shall indicate an "Alarm Condition", and a solid LED shall indicate a "Zone Fault" (open, short, ground, or circuit fault). The Input Control Modules shall also be able to operate independently and in conjunction with Output Control Modules (OCM), which will send an output signal to a corresponding output device upon alarm input activation. Once an alarm has been received, the Input Control Module shall activate any or all alarm outputs within the Output Control Module. The Output Control Module shall provide 16 Form C outputs rated at 5A @ 30VDC. Upon an alarm input from the Input Control Module, the Output Control Module shall transmit an activating signal to a corresponding output device. Up to 16 ICMs shall be connected to an available ISC using RS-485 cabling. Diagnostic LEDs shall indicate ISC communication, input zone scanning, and Input Control Module heartbeat.

4. The ICM shall contain the following features:

   a. UL 294, ULC, and CE Certified

   b. Alarm contact status scanning at up to 180 times per second for each zone

   c. Eight configuration DIP switches to assign unit addresses and communications speed.

   d. A low power CMOS microprocessor Filtered data for noise rejection to prevent false alarms Up to 16 Grade A, or AA Supervised Inputs in any Combination 12 VAC or

12 VDC Input Power 2 Form C Contacts for load switching 2 dedicated inputs for tamper and power status

E. Lenel 1200: Output Control Module (OCM)

1. The Output Control Module shall incorporate 16 Output Relays that are capable of controlling a corresponding output device upon any input activation or on command from the system.

2. Output relays shall be capable of responding to:

   a. Input alarms from a within the same ISC.

   b. Commands from a system operator.

   c. Time zone control commands for automatic operation.

3. Output relays shall be capable of:
   a. Pulsing for a predetermined duration. Duration shall be programmable for each relay individually.

   b. Following any input point, an ICM attached to the same ISC (on with alarm, off when clear, or as required).

   c. Responding on command from the system operator to pulse, command on, command off, or reset to normal state.

4. Each OCM shall provide 16 Form C relays rated at 5A @ 30 VDC. The OCM shall control the relays by digital communication. Upon an input from the ICM or command from the system operator, the ICM shall transmit an activating signal to a corresponding relay. The OCM shall be UL 294 and CE certified.

F. Lenel 2020W, 2010W, 2020W-NDK, CK - Card Readers and Keypads:

1. The system shall support a variety of card readers and keypads that must encompass a wide functional range. The system may combine any of the card readers described below for installations requiring multiple types of card reader capability (i.e., card only, card and/or PIN, supervised inputs, etc.). These card readers, described below, shall be used in Magnetic Stripe Reader and Wiegand communication format only.

2. All magnetic stripe card readers are to be housed in an aluminum bezel with a wide lead -in for easy card entry. Each card reader shall contain read head electronics, a micro ISC, and a sender to encode digital door control signals. A bi-color LED (s) (red and green) shall be used to indicate card reader status and access status.

3. A flashing red LED shall indicate the card reader is waiting for a card to be entered. A solid red LED is to indicate that the card reader has defaulted to a locked mode of operation. A solid green LED shall indicate the card reader has defaulted to an unlocked mode of operation. The green LED must illuminate upon a valid credential swipe/PIN entry for the duration of the door strike time.

4. Card Readers must be able to support a user defined downloadable off-line mode of operation (locked, unlocked, or facility code), which will go in effect during loss of communication with the ISC.

5. All card readers shall provide audible feedback to indicate access granted/denied decisions. Upon a card swipe, two beeps shall indicate access granted and three beeps shall indicate access denied. All keypad buttons shall provide tactile audible feedback. As many as 32 card readers of any type described below shall be able to be connected to a single ISC port. All card readers may optionally include card reader back boxes for conduit installations.

6. The standard card readers with Wiegand Communications and Clock Data Output shall be provided with or without a keypad. These card readers with a keypad shall include a 12 character, raised membrane tactile keypad with audio feedback, enabling PINs to be used in conjunction with cards.

7. The standard card reader with Wiegand Communications and Clock Data Output must offer the following features: UL 294, ULC, and CE Certified Low Power Surface Mount Card Reader 600,000 pass read head Small, rugged, die cast aluminum Bi-directional card swipe Weatherized Finishes LEDs for access and card reader status Card and PIN data shares same output lines 12VDC or 5VDC Input Power RJ-45 Jack for Quick Installation

F. Lenel 1320: Dual Reader Interface Module (DRI)

1. The dual reader interface module shall provide an interface between the ISC and card readers. The dual reader interface module must operate with any card reader that produces a standard Wiegand (Data 1 j Data 0 or Clock and Data) communication output.

2. As with other card reader types listed above, a single ISC shall be able to multi- drop as many as 32 dual reader interface modules.

3. Each DRI shall support two card readers, each of which shall be up to 500' away from the DRI. Up to sixteen (16) DRIs shall be connected to each port on the ISC.

4. The DRI shall monitor per card reader - door position, exit push button, and 4 auxiliary alarm inputs. It shall also control the electric strike and provide four auxiliary relay outputs

5. The DRI shall support up to eight unique card formats.

6. The DRI shall support an integrated card reader keypad and shall support three access modes upon loss of communication with the ISC; locked, unlocked, and facility code.

7. The DRI shall offer the following features: UL 294, ULC, and CE Certified 12VDC or 12VAC Input Power Support for up to eight Magnetic and Wiegand Card formats Support for Clock Data and Data1jData0 Wiegand Communications 4 Programmable Inputs and 4 Programmable Relay Outputs per Reader

G. Lenel AL6000ULX-4BC, AL400ULX - Field Hardware Power Supplies:

1. Power supplies for field hardware shall be designed specifically for the system equipment installed. These power supplies shall be regulated, isolated versions for the ISC, ICM,

card readers and other equipment. Each version shall be installed with battery backup. All power supplies shall also allow mounting space for the ISC, ICM, SRI, DRI or other device panel required.

2. Minimum specifications: Type UL Listed Class II power limited Input 120 VAC hard wired Output Regulated and filtered DC Alarm outputs Individual low battery and power fail Battery backup Four hours of rechargeable backup for the connected load Battery support Battery charger to maintain Battery Sealed gel type Enclosure Key lockable wall mount housing with tamper switch

H. Lenel 8000: Star Configuration Splitter:

1. The system shall support a star configuration splitter that shall expand a single ISC communications port into eight 2 wire or four 4 wire RS-485 communications ports to be used in a star configuration. All outgoing data shall be broadcast on all eight ports.

I. GE-1078, or Equal Magnetic Door Contact Switch:

1. The system shall consist of magnetic door contact switches shall be designed specifically for the use in recessed applications in any type of pedestrian door and frame made of material such as aluminum, wood, or steel. The switch will be 1" in diameter with SPDT normally-open or normally-closed contact configuration consisting of 22AWG wire leads from the hermetically sealed reed switch encapsulated in polyurethane.

J. Honeywell DT-6360STC, or Equal, Dual-Technology Motion Detector:

1. The system shall consist of dual-technology ceiling-mounted motion detectors for the detection of movement within a designated space. The detectors will be a combination of microwave and PIR (Passive Infrared) technologies with built- in diagnostics and supervision. The device will have a 360-degree field-of-view, may be recessed or surface mounted at heights from 8' to 16' above area to be protected, operates on 10-13VDC, and contains a Form C NO NC alarm relay.

K. Honeywell FG-730, or Equal, Glass-Break Detector:

1. The system shall consist of dual-technology glass-break detectors for the detection of the breaking of glass within a designated area. The detectors will utilize a combination of monitoring for flex (impact) and audio (shattering) frequencies. For an alarm to occur, the flex signal must be followed by the audio signal within a pre-described amount of time. The device will be able to detect glass breakages from distances up to 25' and utilizes LED alarm indicators for testing of flex and audio technologies. The device operates on 10-14VDC, utilizes a Form C NOjNC alarm relay, and is 3 7j8"H X 2 2j5"W X 4j5"D.

L. GE-3040CTW, or Equal Hard-Wired Panic Alarm Button:

1. The system shall utilize hard-wired panic alarm buttons in concealed specified locations. The button(s) shall activate the SPDT when the user pulls the actuating lever. An external light on the unit shall light and latch indicating that the alarm circuit has been activated. The device operates on 12VDC and an operating temperature range of 0-110 degrees Fahrenheit.

M. MPI-47E, or equal, Local Door Sounder:

1. The system shall incorporate a local sounder at specific door locations for annunciation of unauthorized entry j exit. The device will be 2.0" in diameter with a 4.5"H X 2.75"W faceplate made to fit a standard single-gang electrical box. Additionally, the unit is to have an operating voltage of 6-14VDC and have a sound output of 106dB at 10'.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install systems in accordance with UL, NEC and all other applicable codes. Install system to comply with drawings and final shop drawings in compliance with manufacturer instructions. Provide all required hardware and labor for rack mounting of head-end system components. Refer to plans for locations and quantities of equipment. Equipment locations shown on plans will be required to be field coordinated to ensure proper system operation. No items of equipment shall be installed in such a manner as to void or reduce the proper operating characteristics of individual components or of the system. Devices such as motion detectors, audio detectors, glass break sensors, etc. shall be installed following the manufacturer's recommendations. Perform all work under the on-site supervision of a factory authorized trained technician. It shall be the responsibility of the technician to check, inspect and adjust this installation to the AjE and University approval. A representative of the installing contractor or manufacturer shall train the University's personnel on the proper operation and maintenance of the equipment. Perform all work in conjunction with this installation in accordance with good engineering practices as established by NEC.

B. Wiring Installation

1. All security wiring shall be run in conduit per section 26 05 00. Wiring for security devices may be daisy-chained together; conduit shall be upsized as required for conduit fill requirements. Where existing cable management systems are in place and there is adequate capacity to install the SMS wiring, the contractor may utilize these pathways providing they have coordinated with all other wiring contractor on site.

2. All communications wiring between the intelligent system controller and all downstream modules, shall be specified and provided consistent with all requirements of all sections of Divisions 26 and 27 specifications, and consistent with all requirements of the manufacturers. All communications on the ACS using RS-485 communications protocol must use 2-pair twistedjshielded wiring, Belden #9842 or Belden equivalent.

a. Belden #9842, or Belden equivalent

b. Numbers of pairs - 2

c. Total numbers of conductors - 4

d. AWG - 24

e. Outer Jacket PVC - polyvinyl chloride

f. NEC/UL specification CM, NON-plenum

g. Outside diameter, .340 inches (24 AWG stranded (7x32) tinned copper conductors, twisted pairs, polyethylene insulated, overall 100% Beldfoil® shield plus a 90% tinned copper braid shield, 24 AWG (7x32) tinned copper drain wire, PVC jacket)

3. Where pathways do not exist for SMS wiring, the contractor shall be responsible for providing all required cable management systems such as J-hooks to support communications cabling to meet building codes and manufacturer's recommendations.

4. All cabling installed in ceiling spaces that are used for air distribution plenums shall be UL plenum rated.

5. This contract shall be responsible for furnishing and installing all required cabling between components to form a complete and operational system meeting all the requirements of this specifications.

C. Grounding:

1. The installing contractor shall be responsible for ensuring the grounding integrity of all installed equipment to eliminate the potential for equipment or personnel hazards due to improperly or inadequately grounded systems.

D. Programming:

1. It is the contractor's responsibility to program the system in this section according to the University's requirements. The contractor shall meet with the University Security department representative prior to programming to determine requirements.

E. Identification

1. Contractor shall identify all major items of equipment and tag all cables with permanent type markers to denote equipment served. Cables shall be tagged at both ends and at each point where the cable is administered.

2. The contractor shall be responsible for generating and programming the labeling for camera information within the recorder software.

F. Testing:

1. The contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all site testing. The University will witness all performance verification. Original copies of all data produced during performance verification shall be turned over to the University at the conclusion of testing prior to final approval.

2. The field testing shall as a minimum include:

a. Verification that alarm points are received annunciated properly and transmitted through the central monitoring station.

b. Verification that all motion detectors have the proper coverage patterns and that false alarms are not being generated due to motion coverage patterns into adjacent areas.

c. Verification that all user input and control features are accessible at each keypad and operators control station.

d. Verification that the final system programming including schedules and sequence of operation are performing as expected.

e. Verification that access control features including door control and door position sensing are operating properly and as required by the University and as established during the programming phase.

3. The contractor shall deliver a report describing results of functional tests, diagnostics, and calibrations including written certification to the University that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. The report shall also include a copy of the approved performance verification test procedure.

G. Training Requirements

1. Provide the University with a minimum of 8 hours of training designed to make all users familiar with the operation of the system.

2. Provide all training and utilize specified manuals and record documentation. All training shall be provided at the project site and coordinated with the University.

I. Warranty

1. Warranty all equipment and materials for a period of 1 year from the date of Final acceptance from the University. If any defects in materials, workmanship or operational failures under "NORMAL" conditions are experienced within the warranty period, promptly correct at no expense to the University. Provide statement of warranty with operation and maintenance manuals.

3.2 OPERATION AND MAINTENANCE MANUALS/ELECTRONIC CAD FILES

A. Provide maintenance manuals for every item of equipment when available from the manufacturer. These shall be the technical manuals provided by the manufacturer and shall not consist of generic sales brochures. Technical manuals shall provide complete specifications for the equipment as well as complete operating, maintenance, troubleshooting and product repair replacement information. Where available only in electronic format, the contractor may provide a CD with electronic versions of the manuals.

B. As Built drawings updated shall be provided to the university with final as-built information. This shall be in the form of a complete set of Technology drawings with as-built information indicated in colored pen based upon actual field conditions.

C. Rack elevations for all systems with rack mounted equipment.

G. Warranty: provide statement of warranty with operation and maintenance manuals.

END OF SECTION 28 13 00

SECTION 28 31 00 – LIFE SAFETY SYSTEM

1.1 GENERAL

A. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions.

1. Fire alarm and detection operations.
2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.
3. One-way supervised automatic voice alarm operations for the purpose of fire alarm evacuation and emergency communication of other life safety emergencies. The system will provide both live messaging and a minimum of eight pre-recorded messages.
4. Interface with PA system to shut down PA during alarm.
5. Interface with access control door lock power supply per 16400.
6. Provide programming and accessories necessary to provide mass notification/amber alert.
7. Smoke detection and power supplies for all smoke dampers.

B. Provide a complete, non-coded, addressable, microprocessor-based fire alarm system with initiating devices, notification appliances (speakers and strobes), and monitoring and control devices as indicated on the drawings and as specified herein.

1.2 PRODUCTS

A. Manufacturer: Basis of cost is Simplex Grinnell. All equipment must be 100% compatible with the existing building's fire alarm network.

B. Provide two (2) Remote LCD Annunciators with the same "look and feel" as the FACP operator interface. The remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDS and LCD Display as the FACP. Locate one in the Fire Command Suite and one in the South Field Level Main Electrical Room.

1.3 EXECUTION

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

1. Factory trained and certified personnel.
2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
3. Personnel licensed or certified by state or local authority.

C. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

D. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.
2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
3. Certified by a state or local authority.
4. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

END OF SECTION 28 31 00

SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Auburn University Design and Construction Guidelines (Latest Edition)

1.2 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain.
   2. Removing existing vegetation.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Removing above- and below-grade site improvements.
   6. Disconnecting, capping or sealing, and removing site utilities.
   7. Retain subparagraph below if erosion- and sedimentation-control measures are not included in Section 015000 "Temporary Facilities and Controls."
   8. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

C. ADEM Notice of Intent (NOI): Contractor shall apply for and have in place an active ADEM NOI and Construction Best Management Practices Plan (CBMPP) for the subject project prior to beginning.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

E. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

H. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches above the ground.

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to Auburn University Standards and Specifications.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Grind down stumps and remove roots, obstructions, and debris to a depth of 24 inches below exposed subgrade.
   3. Use only hand methods for grubbing within protection zones.
   4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within protection zones.
   3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
   4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 20 00 - EARTH MOVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

B. Geotechnical Report; Not Available.

1.2 SUMMARY

A. Section Includes:
1. Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.3 UNIT PRICES

A. All excavation is to be unclassified to the “Cut Line” regardless of material encountered.

B. However, a certain portion of the work will be handled with a quantity allowance with unit price being provided on AU Form C-3C attachment to ABC form C-3 proposal form to be included in the base bid. Below is a brief description of the requirements associated with the unit prices referenced above:
1. The unit price for “excavation and haul off of unsuitable materials” shall include all cost associated with removing unsuitable soil from below “cut line” elevations and off-site disposal of the unsuitable material. Unsuitable materials refers to material that is not suitable for building or pavement support for reasons associated with material properties, such as highly plastic soils, “fat” clays, old fill material or alluvium. The owner’s onsite geotechnical engineer will be solely responsible for determining the suitability of soils encountered.
2. The unit price for “replacement with crushed stone” shall include all cost associated with the purchasing, transporting, installation and compacting of ALDOT #57 stone or dense-graded aggregate base material for soil stabilization and/or backfill at the discretion of the owners onsite geotechnical engineer. Pipe bedding material will not apply to this allowance.
3. The unit price for “replacement with onsite suitable material” shall include all costs associated with onsite excavation, transporting, placing and compacting the material to the project specifications. Backfill shall be accomplished with the use of suitable onsite excess material to the extents possible.
4. The unit price for “replacement with offsite suitable material” shall include all cost associated with purchasing, importing, placing and compacting of material conforming to the project specifications from an offsite source in the event that adequate suitable material is not present on the project site.

5. The unit price for "Surge Material (ALDOT #1 Stone)" shall include all cost associated with the purchasing, transporting, installation and compacting of ALDOT #1 stone for soil stabilization at the discretion of the owners onsite geotechnical engineer.
6. The unit price for installation of stabilization fabric shall include all cost associated with the purchase and installation of geogrid for soil stabilization. This material shall be Tensar BX1100 (Tensar Biaxial type 1) or approved equal. All installations shall be at the discretion of the owner's onsite geotechnical engineer and per the manufacturer's recommendations.
7. Note the unit prices are being provided for the addition to and deletion from the contract base bid as required by changing field conditions during construction. The application of these allowances and unit prices shall be at the sole discretion of the owner's Construction Manager. Payment for all items will be made based on actual in place material.
8. The contractor is to provide a topographic map of actual field conditions prior to and upon completion of excavation. (Prior to replacing material) An additional topographic map will be necessary at the point that the replacement source transitions from onsite material to imported material and/or crushed stone.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase or subgrade course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Underslab capillary break/leveling course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, base course, drainage fill, underslab leveling course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

L. Cut Line: In a cut section, the cut line shall be defined as subgrade elevation or elevation required by other specified hold down, over excavation, trench excavation, subgrade stabilization etc. In a fill section, the cut line shall be defined as the elevation achieved upon completion of all topsoil stripping, grubbing operations, etc. as approved by the owner's onsite geotechnical engineer prior to placing fill material.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:
   1. Geotextiles.
   2. Controlled low-strength material, including design mixture.

B. Samples for Verification: For the following products, in sizes indicated below:
   1. Geotextile: 12 by 12 inches (300 by 300 mm).
   2. Warning Tape: 12 inches (300 mm) long; of each color.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
   1. Classification according to ASTM D 2487.
   2. Laboratory compaction curve according to ASTM D 698.

C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.7 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.8 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Section 311000 "Site Clearing," are in place.

D. Do not commence earth moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

E. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, GC, SC, CL, ML, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
   1. Liquid Limit: 25 to 40.
   2. Plasticity Index: 6 to 14.
   3. Maximum dry density greater than 95 pcf.
   4. Moisture content: ± 2 percent of optimum moisture as defined by ASTM D698 for cohesive soils. For cohesionless soils with >12 % passing the US Standard No. 200 sieve, ± 3 of optimum moisture as defined above. Moisture requirement is waived for cohesionless soils with <12 % passing the No. 200 sieve.

C. Unsatisfactory Soils: Soil Classification Groups OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within +/-2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 3/4-inch (19-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Underslab: Leveling/Capillary Break Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

J. Sand: ASTM C 33; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.2 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 15 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 200 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Dewatering is solely the responsibility of the contractor.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to the “Cut Line” shall be unclassified regardless of materials encountered.

B. The contractor should anticipate encountering areas of unsuitable materials including, but not limited to, medium to low consistency fill material, etc, both above and below the cut line elevations. Unsuitable material encountered above the cut line shall be removed from the project site as a part of the unclassified base bid amount. Unsuitable material encountered below the cut line elevation shall be undercut and replaced as a part of the quantity allowance/unit prices previously established.

C. Where Rock is encountered within 18” of subgrade in paving areas and 36” of subgrade in the building pad area, the cut line shall be 18” below subgrade in paving areas and 36” below

subgrade in the building pad area. This over excavation shall be backfilled with select fill material at the direction of the onsite geotechnical engineer.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms and sides of excavations to required lines and grades to leave solid base to receive other work and to permit clearance around the reinforcing steel.

B. Excavations at Edges of Tree- and Plant-Protection Zones:
   1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
   1. Clearance: As indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
   3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
   4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:
1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes) to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph (5 km/h).
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.

3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete"

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing. Systematic compaction of utility trench backfill and around all below ground structures such as manholes, junction boxes, etc., will be required even if crushed stone is used.

F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.

G. Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm)in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches (150 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 98 percent.
   2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
   3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
   2. Walks: Plus or minus 1 inch (25 mm).
   3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place base course under pavements and walks as follows:
   1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape base course to required crown elevations and cross-slope grades.
4. Place base course 6 inches (150 mm) or less in compacted thickness in a single layer.
5. Place base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
6. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 1557.

C. Pavement Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than 98 percent of maximum dry unit weight according to ASTM D 1557.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections. The testing agency will be engaged solely for the benefit of the owner, and consequently, testing reports generated by the testing agency will be for the sole benefit of the owner. Because quality control is such an important concern, contractors and subcontractors shall develop their own plans and retain their own personnel to achieve it. The testing agency will non be responsible for the contractor’s construction methods or for site safety.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other

footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2500 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
   1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Soil and building treatment with termiticide.

1.3 SUBMITTALS

A. Product Data: For each type of termite control product.

1. Include the EPA-Registered Label for termiticide products. Product must also be Alabama Department of Agriculture & Industries approved.

B. Qualification Data: For qualified Installer.

C. Product Certificates: For termite control products, from manufacturer.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records. Report must be submitted before concrete is placed and finished or cavities closed. Report shall include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Pre-installation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered, Alabama Department of Agriculture & Industries approved, termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

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. BASF Corporation, Agricultural Products; Termidor.
b. Bayer Environmental Science; Premise 75.
c. FMC Corporation, Agricultural Products Group; Talstar
d. Syngenta; Demon TC.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Termiticide must be mixed onsite. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Cold-applied joint sealants.
   2. Hot-applied joint sealants.

B. Related Sections:
   1. Section 321313 "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.
   1. Use manufacturer's standard test method to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   3. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
   4. Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

D. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

2.3 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of joint-sealant backings.
   2. Do not stretch, twist, puncture, or tear joint-sealant backings.
   3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place joint sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
   1. Remove excess joint sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within cement concrete pavement.
   1. Joint Location:
      a. Expansion and isolation joints in cast-in-place concrete pavement.
      b. Contraction joints in cast-in-place concrete slabs.
      c. Other joints as indicated.
   2. Silicone Joint Sealant for Concrete: Single component, nonsag or Single component, self-leveling.
   3. Urethane Joint Sealant for Concrete: Multicomponent, pourable, traffic-grade.

4. Hot-Applied Joint Sealant for Concrete: Single component.
5. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

B. Joint-Sealant Application: Joints between cement concrete and asphalt pavement[<PJS-#>].
1. Joint Location:
   a. Joints between concrete and asphalt pavement.
   b. Joints between concrete curbs and asphalt pavement.
   c. Other joints as indicated.
2. Hot-Applied Joint Sealant for Concrete and Asphalt: Single component.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Pipe and fittings.
   2. Nonpressure transition couplings.
   3. Cleanouts.
   4. Drains.
   5. Manholes.
   6. Channel drainage systems.
   7. Catch basins.
   8. Stormwater inlets.
   9. Stormwater detention structures.
   10. Pipe outlets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. Manholes: Include plans, elevations, sections, details, frames, and covers.
   2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.
   3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.

B. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage 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 Construction Manager no fewer than two days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Construction Manager's written permission.

PART 2 PRODUCTS

2.1 PIPING AND FITTINGS

A. Storm sewer piping 15” and greater:
   1. Reinforced Concrete Pipe (RCP) conforming to the requirements of ASTM C76, Wall type B. Pipe class shall be determined by laying depth; Class III for cuts 0 to 10 feet, Class IV for cuts 10 to 20 feet, Class V for all cuts exceeding 20 feet. Pipe shall be installed such that the pipe bell is upstream of the pipe spigot. Refer to Appendix A for details.
   2. Pipe end treatment shall be bell and spigot manufactured in accordance with ASTM C76 with joint lengths no less than 8’ and no greater than 16’. Gaskets for bell and spigot joints shall be rubber O-ring gaskets manufactured in accordance with ASTM C361 and ASTM C433.
   3. RCP shall be manufactured wet cast, dry cast or centrifugally cast or by the redensification method.
   4. All pipe lift holes are to be plugged with a mortar mix consisting of one part Portland cement, two parts sand by volume and water as required to produce a stiff workable mixture.
   5. All joints in RCP shall be fully wrapped in filter fabric meeting the requirements of ALDOT Type A silt fence.

B. Storm sewer piping smaller than 15” in diameter.
   1. Ductile iron pipe which shall be cement mortar lined in accordance with ANSI A21.4/ AWWA C104; standard thickness, with asphaltic seal coat. Ductile iron pipe shall also be furnished with outside asphaltic coating of 1 mil thickness per ANSI A21.51/AWWAC151. Pipe shall be installed such that the pipe bell is upstream of the pipe spigot. Refer to Appendix A for details.
   2. All ductile iron pipe and fittings shall have a minimum pressure class rating of 350.
   3. Joints for ductile iron pipe to be installed underground shall be “Push-on” joint pipe, in compliance with ANSI/AWWA A21.11-07/C111.
   4. Gaskets for “Push-on” joint pipe shall be Styrene Butadiene.

2.2 MANHOLES

A. Manholes shall be Precast Reinforced concrete only. No block or brick masonry. Precast Reinforced Concrete Manholes shall meet the requirements of ASTM C-478. Cement shall be

Type II with C3A content of 6.5% or less. Manhole connections shall be accomplished through the use of flexible connectors or using mortar comprised of 1 part Portland Type II cement and 2 parts sand by volume. See Appendix A for details.

B. Manhole base, eccentric cone and riser section shall be equipped with non- penetrating lifting inserts, Press-Seal GASKET Corporation or approved equal.

C. Manhole cone section shall be suitable for mounting cast iron manhole frames and covers as described below.

D. Joints between manhole sections shall be offset tongue and groove type and shall utilize a pre-lubricated manhole gasket which meets the following requirements:
   1. Gasket shall consist of a compression section and a serrated mantel section which slides over the compression section as the manhole sections are placed together.
   2. Gasket shall meet the requirements of ASTM C 443, Tylox Super-Seal as manufactured by Hamilton Kent or approved equal.

E. Manhole frames and covers shall be cast from gray iron meeting the requirements of ASTM A48, Class 30 or greater conforming to the following:
   1. Minimum clear space opening for frames and covers is 21 7/8".
   2. Non-drainage frames and covers installed in landscaped areas shall weigh not less than 290 lbs. Non-drainage frames and covers installed in hardscape areas and subject to traffic shall be H 20 rated and shall weigh not less than 375 lbs. Non-drainage frames and covers installed in Type-S inlets shall be Neenah Foundry R-6144 or approved equal. Drainage frames and covers installed in landscaped areas shall be Neenah Foundry R-2560-EA or approved equal. In the event a round cover is not practical use frame and cover of Neenah Foundry R-4346 or approved equal. Drainage frames and covers installed in hardscape areas and subject traffic shall be H 20 rated and shall be Neenah Foundry R-3561 or approved equal. Frames and covers installed in pedestrian areas shall be rated for pedestrian service.
   3. Covers shall be labeled "STORM SEWER." Refer to Appendix A for details.
   4. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching manhole frame and grate. Include sealant recommended by ring manufacturer.
   5. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.

F. Manhole steps shall conform to one of the following requirements:
   1. Gray Iron or Ductile Iron integrally cast into the manhole barrel, meeting the requirements of ASTM A48.
   2. Gray Iron or Ductile Iron equipped with inserts integrally cast into the manhole barrel having steps bolted on, meeting the requirements of ASTM A48.
   3. Copolymer polypropylene plastic, meeting the requirements of ASTM D 2146 reinforced with a ½" diameter deformed bar meeting the requirements of ASTM A 615.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts:
   1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
   2. Top-Loading Classification(s): Heavy Duty and Extra-Heavy Duty.

3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.4 DRAINS

A. Cast-Iron Area Drains:
   1. Description: ASME A112.6.3 gray-iron round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
   2. Top-Loading Classification(s): Heavy Duty.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R (ACI 350M/350RM), and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.
   1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
   2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
   1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
      a. Invert Slope: 2 percent through manhole.
   2. Benches: Concrete, sloped to drain into channel.
      a. Slope: 4 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.
   1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
   2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.6 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.

B. Sloped-Invert, Polymer-Concrete Systems:
   1. Channel Sections:
      a. Interlocking-joint, precast, modular units with end caps.
      b. 4-inch (102-mm) inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.

c. Extension sections necessary for required depth.
d. Frame: Include gray-iron or steel frame for grate.

2. Grates:
   a. Manufacturer's designation "Heavy Duty," with slots or perforations that fit recesses in channels.
   b. Material: Stainless steel.
3. Covers: Solid gray iron if indicated.
4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

2.7 PLASTIC, CHANNEL DRAINAGE SYSTEMS

A. General Requirements for Plastic, Channel Drainage Systems:
   1. Modular system of plastic channel sections, grates, and appurtenances.
   2. Designed so grates fit into frames without rocking or rattling.
   3. Number of units required to form total lengths indicated.

B. Fiberglass Systems:
   1. Channel Sections:
      a. Interlocking-joint, fiberglass modular units, with built-in invert slope of approximately 1 percent and with end caps.
      b. Rounded or inclined inside bottom surface, with outlets in quantities, sizes, and locations indicated.
      c. Width: 8 inches (203 mm).
   2. Factory- or field-attached frames that fit channel sections and grates.
      a. Material: Manufacturer's standard metal.
   3. Grates with slots or perforations that fit frames.
      a. Material: Stainless steel.
   4. Covers: Solid gray iron if indicated.

2.8 CATCH BASINS

A. Standard Precast Concrete Catch Basins:
   1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
   2. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
   3. Riser Sections: 4-inch (102-mm) minimum thickness, 48-inch (1200-mm) diameter, and lengths to provide depth indicated.
   4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
   5. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
   6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
   7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.

8. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches (1500 mm).
9. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for joint sealants.
1. Joint Sealants: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
2. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.
4. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches (1500 mm).
5. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches (610 by 610 mm) minimum unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with small square or short-slotted drainage openings.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.9 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening.

B. Gutter Inlets: Made with horizontal gutter opening. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy duty.

2.10 STORMWATER DETENTION STRUCTURES

A. Cast-in-Place Concrete, Stormwater Detention Structures: Constructed of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
1. Ballast: Increase thickness of concrete as required to prevent flotation.
2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 229-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and cover.

3. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of structure to finished grade is less than 60 inches (1500 mm).

B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

2.11 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

PART 3 EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:
   1. Install piping pitched down in direction of flow.
   2. Install piping with 36-inch (915-mm) minimum cover.
   3. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
   4. Install PE corrugated sewer piping according to ASTM D 2321.
   5. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:
   1. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
   2. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
   3. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
   4. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
   5. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
   1. Use Extra-Heavy-Duty, top-loading classification cleanouts.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep. Set with tops above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 DRAIN INSTALLATION

A. Install type of drains in locations indicated.
   1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
   2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
   3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.
   4. Use Extra-Heavy-Duty, top-loading classification drains in roads.

B. Embed drains in 4-inch (102-mm) minimum concrete around bottom and sides.

C. Fasten grates to drains if indicated.

D. Set drain frames and covers with tops flush with pavement surface.

E. Assemble trench sections with flanged joints.

F. Embed trench sections in 4-inch (102-mm) minimum concrete around bottom and sides.

3.6 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.8 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

3.9 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.10 CHANNEL DRAINAGE SYSTEM INSTALLATION

A. Install with top surfaces of components, except piping, flush with finished surface.

B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.

C. Embed channel sections and drainage specialties in 5-inch (102-mm) minimum concrete around bottom and sides.

D. Fasten grates to channel sections if indicated.

E. Assemble channel sections with flanged or interlocking joints.

F. Embed channel sections in 6-inch (102-mm) minimum concrete around bottom and sides.

3.11 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 221413 "Facility Storm Drainage Piping."

B. Connect force-main piping to building's storm drainage force mains specified in Section 221413 "Facility Storm Drainage Piping." Terminate piping where indicated.

C. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches (76 mm) of concrete to be packed around

entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.12 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
   1. Close open ends of piping with at least 8-inch- (203-mm-) thick, brick masonry bulkheads.
   2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
   1. Remove manhole or structure and close open ends of remaining piping.
   2. Remove top of manhole or structure down to at least 36 inches (915 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Section 312000 "Earth Moving."

3.13 IDENTIFICATION

A. All new storm sewer laterals and mains shall include underground warning tape placed 1’ above pipe during pipe backfill operations. Warning tape shall be non-conductive Poly 3” wide with 1” lettering 4 mils thick. Warning tape shall conform to APWA uniform color codes and shall read “BURIED SEWER LINE”.

3.14 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and video inspect at completion of Project.
   1. Submit separate reports/video for each system inspection.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
      c. Damage: Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
b. Option: Test plastic piping according to ASTM F 1417.
c. Option: Test concrete piping according to ASTM C 924 (ASTM C 924M).

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.15 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION