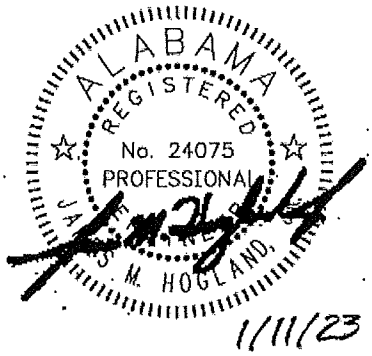
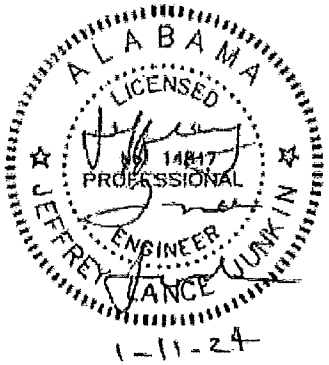
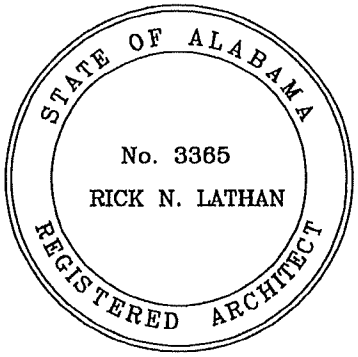

H. Craig Winn, P.E.








ARCHITECT'S JOB NO. 23-41

DATED: January 11, 2024

PSCA NO. 051C / 9608

**CLASSROOM ADDITION FOR MARGARET ELEMENTARY SCHOOL**

**OWNER**

**ST. CLAIR COUNTY BOARD OF EDUCATION**
**410 ROY DRIVE**
**ASHVILLE, AL 35953**

**SCHOOL BOARD MEMBERS**

| | |
|---|---|
| MR. SCOTT STUTTLE | BOARD PRESIDENT |
| MRS. NICKIE STEVENS VAN PELT | BOARD VICE PRESIDENT |
| MRS. CATHY FINE | BOARD MEMBER |
| MR. BOGIE LOVELL | BOARD MEMBER |
| MR. BILL MORRIS | BOARD MEMBER |
| MS. ALLISON GRAY | BOARD MEMBER |
| MR. RANDY THOMPSON | BOARD MEMBER |

**DR. JUSTIN BURNS** **Superintendent**

LATHAN
ARCHITECTS

**SPECIFICATION INDEX**
**CLASSROOM ADDITION TO MARGARET ELEMENTARY SCHOOL**
**Architect's No. 23-41**

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01200 Temporary Facilities and Controls
01300 Quality Control Services
01350 Shop Drawing Submittals
- Electronic Submittal Agreement

01360 Product Substitution Procedures
- Prior Approval / Substitution Request Form

01400 Materials and Equipment
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- Final Report of Special Inspections
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- Quality Assurance for Storm Shelter
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02510 Water Distribution
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NOTE: This Index is for convenience only. Its accuracy and completeness are not guaranteed, and it is not to be considered part of the Specifications. In case of discrepancy, the Specifications shall govern. Certain items may be included by means of notes on the Drawings; such items are not necessarily covered in the Specifications. Contractor shall verify all existing conditions and all dimensions at the project site.

**TEAM LIST**
**CLASSROOM ADDITION FOR MARGARET ELEMENTARY SCHOOL**
**Architect's Job No. 23-41**

**OWNER:**
ST. CLAIR COUNTY BOARD OF EDUCATION
410 Roy Drive
Ashville, AL 35953

**ARCHITECT:**
LATHAN ASSOCIATES ARCHITECTS, P. C.
300 Chase Park South, Suite 200
Hoover, AL 35244
Contact: rfi@lathanassociates.com

**CIVIL:**
LBYD, INC.
880 Montclair Road, Suite 600
Birmingham, AL 35213

**STRUCTURAL:**
STRUCTURAL DESIGN GROUP
300 Chase Park South, Suite 125
Hoover, AL 35244

**MECHANICAL/ PLUMBING:**
PINNACLE ENGINEERING, INC
2111 Parkway Office Circle
Suite 125
Birmingham, AL 35244

**ELECTRICAL:**
STEWART ENGINEERING
300 East 7th Street
Anniston, AL 36202

**LIST OF DRAWINGS**
**CLASSROOM ADDITION FOR MARGARET ELEMENTARY SCHOOL**
**Architect's Job No. 23-41**

**DRAWINGS INDEX (SET 46 TOTAL SHEETS)**

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|---|---|
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| C1.0 | DEMOLITION PLAN |
| C2.0 | SITE LAYOUT PLAN |
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| **ARCHITECTURAL (14 SHEETS)** | |
|---|---|
| A1.1 | ARCHITECTURAL SITE PLAN |
| A2.1 | FLOOR PLAN, DEMOLITION PLAN AND DOOR SCHEDULE |
| A2.2 | ROOF PLANS |
| A2.3 | ROOF DETAILS |
| A2.4 | WINDOW SCHEDULE AND DETAILS |
| A3.1 | BUILDING ELEVATIONS |
| A3.2 | BUILDING SECTIONS |
| A3.3.1 | WALL SECTIONS |
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| A3.3.3 | WALL SECTIONS |
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| A5.1 | ENLGARGED TOILET PLANS, LEGEND, INTEIOR ELEVATIONS, AND DETAILS |
| A7.1 | REFLECTED CEILING PLAN, FINISH FLOOR PLAN, LEGENDS, DETAILS AND NOTES |
| A8.1 | ROOM SIGNAGE FLOOR PLAN, LEGENDS, AND DETAILS |

| **STRUCTURAL** | **(10 SHEETS)** |
|---|---|
| S1.0 | GENERAL NOTES |
| S1.1 | GENERAL NOTES CONTINUED |
| S1.2 | TYPICAL DETAILS |
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| S2.1 | FOUNDATION PLAN |
| S2.2 | ROOF FRAMING PLAN |
| S3.1 | SECTIONS AND DETAILS |
| S3.2 | SECTIONS AND DETAILS |
| S3.3 | SECTIONS AND DETAILS |

**PLUMBING (2 SHEETS)**

| | |
|---|---|
| P0.1 | PLUMBING LEGEND, SCHEDULES, AND ABBREVIATIONS |
| P2.1 | FLOOR PLANS PLUMBING |

**MECHANICAL DRAWINGS (5 SHEETS)**

| | |
|---|---|
| M0.1 | MECHANICAL LEGEND, ABBREVIATIONS, AND SCHEDULES |
| M1.1 | FLOOR PLAN MECHANICAL |
| M2.1 | MECHANICAL DETAILS |
| M2.2 | MECHANICAL DETAILS |
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**ELECTRICAL DRAWINGS (5 SHEETS)**

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| E3.1 | FLOOR PLAN – LIGHTING |
| E4.1 | FLOOR PLAN – POWER |
| E5.1 | FLOOR PLAN – AUXILIARIES |

QUALIFYING CONDITIONS FOR GENERAL CONTRACTORS:

The following conditions and terms may be required upon Owner's request and it shall be each Contractor's responsibility to ensure that they meet the minimum requirements set forth.

General Contractors wishing to bid on this school project shall meet the following minimum provisions regarding responsibility, in addition to all other requirements listed herein: Contractor shall have constructed not less than one educational project of similar size and complexity within the last five (5) years, with similar costs prorated for construction cost increases and Contractor shall be capable of 100% bonding of materials and 100% bonding of labor. All General Contractors wishing to bid shall have a minimum of five (5) years of experience doing business under the same firm name in which the bids are submitted. Joint venture contracts will not be approved.

Each General Contractor shall submit a list of all educational projects within the last five years and a statement from the Owners certifying faithful performance that construction completion was, or will be, obtained without protracted delay and/or defective work for the project. Full explanation should be submitted for any delayed completion. Inexperienced or non-responsible contractors are precluded from bidding and award.

Each General Contractor shall submit names and qualifications of main construction personnel to be placed on this project. The proposed project superintendent and the project manager shall have a minimum of five (5) years of work experience in their respective positions in managing and constructing projects similar in size, complexity and cost. Resumes of project superintendent and project manager shall be submitted. The Owner reserves the right of approval of the project superintendent.

Equivalent experience and qualifications will be considered where the bidder can demonstrate special management and construction abilities, expert workmen and past experience in constructing similar complex structures of similar size and cost such as hospitals, college buildings, multi-story office buildings, court houses, jails, hotels, etc. No consideration will be given to wood frame, residential projects, parking structures, small one-story strip shopping centers, warehouses and industrial buildings, etc. Under this provision of equivalency, no consideration or award will be given to any contractor whose comparable project value is less than 50% of the value of the project under bid.

Each General Contractor bidding on this project will be required to demonstrate that his major Subcontractors are capable of pre-qualifying under the same conditions stated above.

All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

The Owner and its representatives shall be the sole judge of the Contractor meeting the requirements set forth. The Owner's decision in determining qualified General Contractors will be final. The Owner reserves the right to act in its best interests in this determination process to waive all technicalities and informalities and to select the best qualified responsible General Contractors who comply with the above stated provisions.

All of the above information shall be required upon the Owner's request and may be considered a condition for award of contract.

## PRE-BID PROCEDURES

### OBTAINING PLANS AND SPECIFICATIONS

A. General Contractors

General Contractors must contact the office of the Architect to receive an Application for Bid and give the following information about their company:

1. Name, address, phone, email address, Alabama General Contractor's License Number, Bid Limit, and Bid Classification as it appears on current license. This is required in order for Architect to verify that Contractor is currently licensed in a classification that qualifies the General Contractor to bid on the subject project.

2. Upon receipt of the completed Application for Bid Form, General Contractor Bidders may obtain digital copies of drawings and specifications from the Architect. General Contractors will then be placed on Official Bidders List. Hard copy sets of drawings/ specifications will be available to General Contractors for purchase directly from the document printer: Alabama Graphics. Addenda and other proposal information will be issued only to holders of drawings and specifications distributed by the Architect and on the Official Bidders List. Release of contract documents to the bidder does not imply acceptance of the bidder's qualifications by the Owner or Architect.

3. Bids received from General Contractors who are not on the Official Bidders List may not be accepted or opened. Lathan Associates Architects, P.C. makes no guarantee for plans and specifications obtained by Contractors and Vendors from sources other than the Architect or the designated contract printer.

4. The following Plan Room is used:

    a. Alabama Graphics Digital Plan Room is also used. See attachment for contact information. **Project Password is Lathan**.

5. Addenda are only sent to the Plan Rooms, the Awarding Authority and the General Contractors who are on the Official Bidders List. Addenda are not sent to Subcontractors and/or Vendors.

6. CAD files will not be sent by the Architect, Engineers or Consultants to Contractors for bid purposes.

B. Subcontractors and Vendors

1. Subcontractors and Vendors may view and/or obtain plans and/or specifications from the following sources:
    a. Alabama Graphics Digital Plan Room.
    b. General Contractors

2. Architect's office will not release plans and specifications to Subcontractors or Vendors.

3. Official Bidders List is available on Alabama Graphics Digital Plan Room.

    a. So that we may maintain an updated Official Bidders List, as a courtesy, we ask that Contractor submit an email to the office of the Architect if they would like to withdraw.

### REQUEST FOR INFORMATION (RFI's)

A. All RFI's must be numbered and made in writing to the Architect's email rfi@lathanassociates.com. Please include your name, company name and telephone number, so that we may respond appropriately. **VERBAL RFI'S WILL NOT BE ANSWERED. ALL RFI'S MUST BE IN WRITING.**

B. The Team List provided within the Specification Manual is for informational purposes only and should

not be used to contact Engineers and/or Consultants directly with questions regarding the project.

C. All questions that need to be directed to an Engineer / Consultant must be routed through the Architect's office. If applicable, the Architect will contact the appropriate Engineer / Consultant for information.

D. Bids shall be based upon the official Contract Documents consisting of Plans, Specifications and Addenda. Architect assumes no responsibility for information used by Contractors outside the official Contract Documents.

E. We will not respond to any correspondence received via any e-mail other than the one listed.

**REQUESTS FOR PRODUCT APPROVAL**

A. All Requests for Product Approval must be made in writing to the office of the Architect. Requests must be accompanied by Product Substitution Form completed and signed found in Specification Section - 01360 and should be emailed to Lathan Associates Architects, rfi@lathanassociates.com. Please include your name, company name, telephone number, email address so that we may respond appropriately.

B. Vendor/Contractor submitting Request for Product Approval must submit data sheets and other such project specific fact-based documentation for substitution with items clearly marked to show compliance with product originally specified. Request must identify model number of substitution that complies with product originally specified. **Architect and Interior Design staff will not review Requests for Product Approval that are catalogs and/or binders of manufactured products without separate details showing comparison between specified product and requested substitution.**

C. Products approved by Architect, Interior Designer, Engineer and/or Consultant shall be contingent upon meeting or exceeding the specification and drawing requirements. All approved requests for product approval shall be acknowledged in writing via Addendum.

D. The Team List provided within the Specification Manual is for informational purposes only and should not be used to contact Engineers and/or Consultants directly with requests for product approval. No product approval shall be considered unless submitted through the Architect.

## PRE-BID REQUEST FOR INFORMATION FORM

Date: _____

Company Submitting Request: _____

Contact Name: _____ Phone: _____

E-Mail _____

Project Name: _____

Architect Job No._____

Send to rfi@lathanassociates.com

RFI NO._____

**RESPONSE:**

---

For Architect's Use:
Reviewed By / Date: _____
Responded By/ Date:_____
Processed by Addendum No. _____
Comments: _____

# Digital Plan Room Sign-On Instructions

To access the Digital Plan Room, please click on the following link. You will want to add this as a trusted site for future emails.
https://www.algraphicsplanroom.com

You will need to register to the plan room as a user. Click **"Log In"** on lower left side. You will need to do a search to see if your company already exists on the plans room. Once you register your company and contact information click on **"Private Jobs with Passwords"** and enter the password provided.

Password for this project is lathan.

For technical assistance please call, Customer Service 205.252.8505 or customerservice@algraphics.com.

# INSTRUCTIONS TO BIDDERS

## CONTENTS



## 1. BID DOCUMENTS:

The Bid Documents consist of the Advertisement for Bids, these Instructions to Bidders, any supplements to these Instructions to Bidders, the Proposal Form and the Accounting of Sales Tax, 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. DCM Form C-3: 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. A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with the Proposal Form.

**(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. DCM Form C-3A: Accounting of Sales Tax**

A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

**c. 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.

**d. 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:

**a.** 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.

**b.** A list of all proposed major subcontractors and suppliers will be submitted by Bidders to the Architect 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. If the list includes a fire alarm contractor and/or fire sprinkler contractor, Bidders will also submit a copy of the fire alarm contractor's and/or fire sprinkler contractor's permits from the State of Alabama Fire Marshal's Office.

## 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 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 (from the Lead Design Professional) |
| **(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 along with distribution of the fully executed construction contract to all parties. | 15 calendar days after final execution of contract by the Awarding Authority, by various State Agencies if required 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

Kay Ivey
Governor

Bill Poole
Director of Finance

STATE OF ALABAMA
DEPARTMENT OF FINANCE
REAL PROPERTY MANAGEMENT
Division of Construction Management

P.O. Box 301150, Montgomery, AL 36130-1150
770 Washington Avenue, Suite 444, Montgomery, AL 36104
Telephone: (334) 242-4082 Fax: (334) 242-4182

Mickey Allen
Assistant Finance Director
Real Property Management

Frank Barnes, Director
Construction Management

# E-Verify Memorandum of Understanding

Instructions for inclusion in project manuals.

Per DCM's May 29, 2012 bulletin *Guidance on Act 2012-491 Amending the Alabama Immigration Law*: "Contractors (including architects and engineers) will … 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."

Upon completing enrollment in the E-Verify program available at https://www.e-verify.gov/employers/enrolling-in-e-verify, an E-Verify Memorandum of Understanding (MOU) is issued to the enrolled business. The same E-Verify MOU can be repeatedly used until any information in the business's E-Verify user profile is updated, at which time E-Verify updates the printable Company Information section of the MOU, while the original signatory information remains the same. Typically, an E-Verify MOU is 13-18 pages long depending on business type and number of employees.

**DCM requires a copy of the entire current E-Verify MOU document including the completed Department of Homeland Security – Verification Division section (with name, signature and date included) to be submitted as an attachment to each Construction Contract original and to each Agreement Between Owner and Architect original.**

# PROPOSAL FORM

To: Blount County Board of Education Date: _____

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:** Classroom Addition to Margaret Elementary School, Architects Job No. 23-41 in accordance with Drawings and Specifications, dated, January 18, 2024 prepared by Lathan Associates Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244, Architect.

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 _____ an 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.

**ALLOWANCES:** The Bidder acknowledges by initials _____ that he/she has read Specification Section 01020 - Allowances and has included cost of same in bid.

**ALABAMA IMMIGRATION LAW COMPLIANCE:** The Bidder acknowledges by initials_____that he/she will comply with H.B. 56 - Alabama Immigration Law Compliance.

**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: N/A

**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 comply.

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

____Bid Bond, executed by _____ as Surety,

____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)** _____ *(Seal)*

* Name & Title ( print) _____

Telephone Number _____

Email Address _____

* If other than an 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.

**Note**: A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

**PROPOSAL FORM ATTACHMENT**

UNIT PRICES

For certain items of **credit or extra work**, if required, the undersigned proposes UNIT PRICES as follows:

| | | |
|---|---|---|
| EARTH EXCAVATION | General | $_____/per cu.yd. |
| | In Trenches | $_____/per cu. yd. |
| EARTH FILL | General | $_____/per cu. yd. |
| UNDERCUTTING & REPLACEMENT OF UNSUITABLE SOILS | | $_____/per cu. yd. |

Note: All grading shown on the drawings shall be included in the Base Bid as Unclassified to required subgrade elevations. This Base Bid grading shall include the required cutting and filling of the existing grade to the proposed subgrade elevation. Onsite Geotechnical engineer shall determine if unsuitable soils are present.

Refer to SECTION 02300 - EARTHWORK for additional information regarding undercut & replacement of unsuitable soils and associated quantity allowance.

Note: Costs for profit and overhead shall be included in Unit Prices.

Note: Unit Prices are provided for the addition to or deletion from the contract Base Bid.

BIDDER (to be signed by an Officer of the Company)

_____ by_____
(Name/Title) (Legal Signature)

WITNESS (to the above signature)

_____ by_____
(Name/Title) (Legal Signature)

DCM Form C-3A
(must be submitted with DCM Form C-3)
August 2021

# ACCOUNTING OF SALES TAX

## Attachment to DCM Form C-3: Proposal Form

## Proposal Form

**To:** St. Clair County Board of Education Date: _____
(Awarding Authority)

**NAME OF PROJECT:** **Classroom Addition to Margaret Elementary School**

_____

## 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: | $ _____ |

**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) _____

* Title _____ *(Seal)*

Telephone Number _____

Email Address _____

Note: A completed DCM Form C-3A: Accounting of Sales Tax must be submitted with DCM Form C-3: Proposal Form. Submission of DCM Form C-3A with DCM Form C-3 is required, it is not optional. A proposal shall be rendered non-responsive if an Accounting of Sales Tax is not provided.

*Do not staple this form; use clips.*

DCM Form C-4
August 2021

# BID BOND

The **PRINCIPAL** (*Bidder's company name and address*)
Name:
Address:

The **SURETY** (*Company name and primary place of business*)
Name:
Address:

The **OWNER** (*Entity name and address*)
Name:
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

Note: Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

*Do not staple this form and/or attachments; use clips. Print single-sided; do not submit double-side printed documents.*

(1) **DCM (BC) Project #** _____ *(required)*

**PSCA Project #** _____ *(required)*

# CONSTRUCTION CONTRACT

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

(2) This Construction Contract is entered into this day of in the year of between the **OWNERS, the ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY**

(3) and **LOCAL OWNER,**
Entity Name:
Address:
Email & Phone #:

(4) and the **CONTRACTOR,**
Company Name:
Address:
Email & Phone #:

State of AL Accounting & Resource System (STAARS) or AL Buys Vendor No.: _____

(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
Firm Name:
Address:
Email & Phone #:

(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 (DCM 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 commence on a date to be specified in a Notice to Proceed issued by the Owner or the Director, Alabama Division of Construction Management, 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.

(13) **SPECIAL PROVISIONS** *(such as acceptance or rejection of unit prices. Indicate continuation on an attachment if needed;*

**A. SEVERABLE PAYMENTS:** The Alabama Public School and College Authority will first pay the Contractor _____ Dollars ($_____) from its available funds and the _____ will thereafter pay the Contractor the remaining _____ Dollars ($_____) from its available funds.

**B.**

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

(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.:

Classification(s):

Bid Limit:

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.

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

(15)

## APPROVALS

**ALABAMA DEPARTMENT OF FINANCE,
REAL PROPERTY MANAGEMENT,
DIVISION OF CONSTRUCTION MANAGEMENT
(DCM)**

By _____
Director

**REVIEWED BY AND FUNDS AVAILABLE:**
PSCA funds are available in the amount stated in
(13) "Special Provisions", Paragraph A.

By _____
Contract Administrator

## CONTRACTING PARTIES

_____
Contractor Company

By _____
Signature

Name & Title _____

_____
Local Owner Entity

By _____
Signature

Name & Title _____

**ALABAMA PUBLIC SCHOOL and COLLEGE AUTHORITY**

By _____ Date: _____
Governor and President of Authority

Review/Signature flow: Architect/Engineer (prepare documents) > Contractor (review and sign) > Architect/Engineer (review) > Local Owner (review and sign) > DCM (review and sign) > Finance-Legal > Governor (review and sign) > DCM (distribute the fully executed Contract to all parties along with a Notice to Proceed).

*Numbers in margin correspond to second page of "Checklist", DCM Form B-7*

(1) # PERFORMANCE BOND

SURETY'S BOND NUMBER

*Do not staple this form; use clips.*

(2) The **PRINCIPAL** (*Company name and address of Contractor as appears in the Construction Contract*)
Name:
Address:

(3) The **SURETY** (*Company name and primary place of business*)
Name:
Address:

(4) The **OWNER: The ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY** and
(*Local Owner entity's name and address, same as appears in the Construction Contract*)
Name:
Address:

(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 second page of "Checklist", DCM 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 second page of "Checklist", DCM 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 & 10) **SURETY:**

_____
Surety Company Name

By_____

_____
Signee's Printed Name and Title

**CONTRACTOR as PRINCIPAL:**

_____
Contractor Company Name

By_____

_____
Signee's Printed Name and Title

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

*Numbers in margin correspond to second page of "Checklist", DCM Form B-7*

(1) # PAYMENT BOND

SURETY'S BOND NUMBER

*Do not staple this form; use clips.*

(2) The **PRINCIPAL** *(Company name and address of Contractor as appears in the Construction Contract)*
Name:
Address:

(3) The **SURETY** (Company *name and primary place of business*)
Name:
Address:

(4) The **OWNER: The ALABAMA PUBLIC SCHOOL AND COLLEGE AUTHORITY** and *(Local Owner entity's name and address, same as appears in the Construction Contract)*
Name:
Address:

(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 second page of "Checklist", DCM 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 & 10)

| **SURETY:** | **CONTRACTOR as PRINCIPAL:** |
|---|---|
| _____ | _____ |
| Surety Company Name | Contractor Company Name |
| By_____ | By_____ |
| _____ | _____ |
| Signee's Printed Name and Title | Signee's Printed Name and Title |

(11) NOTE: Original power of attorney for the Surety's signatory shall be furnished with each of the original three bond forms to be attached to each of the three contract copies (with original signatures) per project.

Do not staple this form; use clips. Purpose: quickly and efficiently scan thousands of documents into DCM's database.

# 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

*Article 3B of Title 41, 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.*



*Revised: 09/2013*

DCM Form C-10
Revised July 2022

DCM (BC) No. _____

PSCA Projects: PSCA No. _____

Application No. _____

Date: _____

# APPLICATION and CERTIFICATE for PAYMENT

*Attach DCM Form C-10SOV: Schedule of Values*

| | |
|---|---|
| TO OWNER:<br>Entity Name:<br>Address: | PROJECT: |
| FROM CONTRACTOR: Company Name & Address, which must exactly match co. name & payment address spelling as registered in State of AL Accounting & Resource System (STAARS) or AL Buys to avoid rejection:<br>STAARS or AL Buys Vendor #: | ARCHITECT / ENGINEER:<br>Firm Name:<br>Address: |

| | |
|---|---|
| A. Total Original Contract | $ |
| B. Fully Executed (fully signed) Change Order(s) Numbers __ through __ | +$ _____ |
| C. Total Contract To Date | $ |

| | | |
|---|---|---|
| 1. Work Completed to Date per attached Schedule of Values *(Form C-10SOV's Column F Total)* | | $ |
| 2. Materials Presently Stored *(When this amount is greater than $0.00, attach Form C-10SM: Inventory of Stored Materials, or similar list)* | | +$ _____ |
| 3. Total Work Completed to Date & Materials Presently Stored *(_____% of Contract To Date)* | | $ |
| 4. Less Retainage *(If Total Work Completed to Date & Materials Presently Stored (#3) is less than or equal to 50% of Total Contract to Date (C), Retainage = #3 x 0.05. Once #3 exceeds 50% of C and up until project is complete, Retainage = C x 0.025. $0 is retained on final payment application, see last bullet point below Instructions.)* | | −$ _____ |
| 5. Total Due | | $ |
| 6. Less Total Previous Payments Billed *(Must exactly match #5 Total Due from previous payment application. # 6 is $0.00 if there is no previous payment application)* | | −$ _____ |
| 7. Balance Due This Estimate | | $ |

Final pay app? ☐ Yes.

## CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that to the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by him for Work for which previous Certificates for Payments were issued and payments received from the Owner and that current payment shown herein has not yet been received.

By: _____ Date: _____
Contractor's Signature

Name & Title _____

Sworn and subscribed before me this _____ day of _____
Day Month, Year

Seal:

_____
Notary Public's Signature

## ARCHITECT'S / ENGINEER'S CERTIFICATION

In accordance with the Contract Documents, the Architect/ Engineer certifies to the Owner that, to the best of the Architect's/ Engineer's knowledge and belief, the Work has progressed to the point indicated herein, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the amount approved.

By _____
Architect's / Engineer's Signature

Name & Title _____

Date _____

## INSTRUCTIONS

- PSCA-funded projects, and State Agency-owned projects: Two copies of pay. app., each with original signatures and all attachments required.
- Date of first payment application cannot precede the Notice to Proceed's Begin Date.
- Pay. app. must exactly match an attached DCM Form C-10SOV: Schedule of Values.
- A change order must be fully executed before inclusion on a payment application.
- Contractor's signature date cannot precede the payment application date.
- Contractor and Notary signee dates must match.
- Progress schedules must be included with non-final payment applications.
- One payment application per month may be submitted.
- On a final payment application, the following is required for release of retainage: all change orders must be fully executed (signed by all parties and approval authorities) and included in B., the Certificate of Substantial Completion for entire work is fully executed, and all other close-out requirements per General Conditions Article 34 are completed.

## APPROVAL

_____
Owner Entity

By _____
Signature

Name & Title _____

Date _____

# SCHEDULE OF VALUES (SOV)

DCM Form C-10SOV
Revised October 2021

| | |
|---|---|
| Project: | DCM (BC) Project Number: |
| | PSCA Project Number, if any: |
| Contractor Company: | Application Number: |
| | Application Date: |
| | Period From: / Period To: |

| A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|
| Item No. | Description of Work | Scheduled Value (including fully executed [signed by all parties] change order amounts) | Work Completed: Work Previously Completed (Previous pay app SOV's column F. D is $0 if this SOV is for first pay app.) | Work Completed: Work Completed This Period (Period as noted above) | Total Work Completed to Date (This application SOV's D + E) | Materials Presently Stored (G total greater than $0 must match C-10SM's column E total. This SOV's G amounts are not in this SOV's D nor E amounts.) | Total Work Completed to Date & Materials Presently Stored (This SOV's F + G) | Percent of Contract Completed to Date (This SOV's H / C) | Retainage (This column's Total's cell formula calculates the applicable variable rate) |
| 1. | | | | | $ - | | $ - | | Retainage Variable Rate: |
| 2. | | | | | $ - | | $ - | | |
| 3. | | | | | $ - | | $ - | | If Total Work Completed to Date & Materials Presently Stored (H) is less than or equal to 50% of Total Scheduled Value (C), Retainage = H x 0.05. |
| 4. | | | | | $ - | | $ - | | |
| 5. | | | | | $ - | | $ - | | |
| 6. | | | | | $ - | | $ - | | |
| 7. | | | | | $ - | | $ - | | |
| 8. | | | | | $ - | | $ - | | |
| 9. | | | | | $ - | | $ - | | |
| 10. | | | | | $ - | | $ - | | |
| 11. | | | | | $ - | | $ - | | |
| 12. | | | | | $ - | | $ - | | |
| 13. | | | | | $ - | | $ - | | |
| 14. | | | | | $ - | | $ - | | Once H exceeds 50% of C and up until project is complete, Retainage = C x 0.025. |
| 15. | | | | | $ - | | $ - | | |
| 16. | | | | | $ - | | $ - | | |
| 17. | | | | | $ - | | $ - | | |
| 18. | | | | | $ - | | $ - | | |
| 19. | | | | | $ - | | $ - | | |
| 20. | | | | | $ - | | $ - | | |
| 21. | | | | | $ - | | $ - | | There will be no retainage on final payment application. |
| 22. | | | | | $ - | | $ - | | |
| 23. | | | | | $ - | | $ - | | |
| 24. | | | | | $ - | | $ - | | |
| 25. | | | | | $ - | | $ - | | |
| | **TOTALS:** | $ - | $ - | $ - | $ - | $ - | $ - | | $ - |
| This pay app SOV's column totals must match amounts in this pay app Form C-10 per the following indicated Form C-10 line #s: | | C. | None | None | 1. | 2. | 3. | 3. | 4. |

Note: If this SOV's column G: Materials Presently Stored includes any amounts other than $0, then DCM Form C-10SM: Inventory of Stored Materials with back-up receipts must be submitted as part of the payment application documentation.

# INVENTORY OF STORED MATERIALS

DCM Form C-10SM
Revised October 2021

| | |
|---|---|
| Project: | DCM (BC) No.: |
| | PSCA No, if any: |
| Contractor Company: | For Estimate No.: |
| | For Period Ending: |

| A | B | C | D | E |
|---|---|---|---|---|
| **Description** | **Materials Stored Last Period** | **Materials Purchased This Period (period noted above)** | **Materials Used This Period (period noted above)** | **Materials Presently Stored (B + C - D)** |
| | | | | |
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| **TOTALS:** | | | | |

Instructions:

- This Form C-10SM must be submitted as part of the payment application documentation when a Materials Presently Stored amount of anything greater than $0 is noted on line 2 of DCM Form C-10: Application and Certificate for Payment.
- Receipts must be provided as attachments to this form C-10SM for all amounts placed in Column C: Materials Purchased This Period.
- The total $ amount of this Form C-10SM's column E: Materials Presently Stored must match both Form C-10's line 2: Materials Presently Stored, and Form C-10SOV: Schedule of Values' total $ amount of Column G: Materials Presently Stored.
- The $ amounts in this current Form C-10SM's Column D: Materials Used This Period are amounts that must all be included in the current payment application's Form C-10SOV's Column E: Work Completed This Period.
- The $ amounts in this current Form C-10SM's Column E: Materials Presently Stored are the amounts that must be listed in the next payment application's Form C-10SM's Column B: Materials Stored Last Period.

| SAMPLE PROGRESS SCHEDULE & REPORT | CONTRACTOR (Contractor may use own form in lieu of Form C-11): | DATE OF REPORT: |
|---|---|---|
| DCM (BC) No.: | | |
| PSCA projects: PSCA No.: | | PROCEED DATE: |
| PROJECT: | | |
| | ARCHITECT/ENGINEER: | 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 | | | | | | | | | | | | | | | | |

LEGEND: ANTICIPATED ACTIVITY ACTUAL ACTIVITY ANTICIPATED CASH FLOW ACTUAL CASH FLOW

USE ADDITIONAL SHEETS IF JOB IS SCHEDULED OVER 12 MONTHS.

DCM Form C-11 August 2021

*Do not staple this form and/or attachments; use clips. Print single-sided; do not submit double-side printed documents.*

DCM Form 9-J, August 2021;
PSCA version of DCM Form C-12;
*A Change Order is not valid without an accompanying completed Change Order Justification (DCM Form B-11).*

# CONTRACT CHANGE ORDER

**Change Order No.** _____ **Date** _____

**DCM (BC) #** _____ *(required)*

**PSCA #** _____ *(required)*

| **TO:** Contractor Company Name & Address: | **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. If the description is continued in an attachment, identify the attachment below.*):

*Description continued from Page 1:*

**ORIGINAL CONTRACT SUM** $ _____

**NET TOTAL OF PREVIOUS CHANGE ORDERS** $ _____

**PREVIOUS REVISED CONTRACT SUM** $ _____

**THIS CHANGE ORDER WILL** ☐ **INCREASE** ☐ **DECREASE THE CONTRACT SUM BY** $ _____

**REVISED CONTRACT SUM, INCLUDING THIS CHANGE ORDER** $ _____

**EXTENSION OF TIME** resulting from this Change Order: ☐ None *or* _____ Calendar days

The amount of this Change Order will be the responsibility of _____
*(Owner and/or PSCA)*

The Owner does hereby certify that this Change Order was executed per the provisions of Title 39, Code of Alabama, 1975, as amended.

_____
Architectural/Engineering Firm

Recommended By _____

Name & Title _____

**APPROVALS**

**ALABAMA DEPARTMENT OF FINANACE,
REAL PROPERTY MANAGEMENT
DIVISION OF CONSTRUCTION MANAGEMENT (DCM)**

By _____
Director

Reviewed By _____
Contract Administrator

**For DCM office use only:**

_____ PSCA funds are available to fund this change order.

_____ PSCA funds will not be used to fund this change order.

**CONTRACTING PARTIES**

_____
Contractor Company

By _____

Name & Title _____

_____
Local Owner Entity

By _____

Name & Title _____

**ALABAMA PUBLIC SCHOOL & COLLEGE AUTHORITY**

By _____ Date: _____
Governor and President of Authority

**CONSENT OF SURETY** (for additive $ change orders only)

_____
Surety Company

By _____
(Attach current Power of Attorney)

Name & Title _____

Review/Signature flow: Architect/Engineer (prepare documents) > Contractor (review and sign) (> Surety for additive $ change orders only [sign]) > Architect/Engineer (review and sign) > Local Owner (review and sign) > DCM (review and sign) > Finance-Legal > Governor (review and sign) > DCM (distribute fully executed Change Order to all parties).

DCM Form B-11
August 2021

TO: **Alabama Department of Finance**
**Real Property Management**
**Division of Construction Management**
770 Washington Avenue, Suite 444
Montgomery, Alabama 36104
(334) 242-4082 FAX (334) 242-4182

# CHANGE ORDER JUSTIFICATION

*Purpose and instructions on next page.*
*Do not staple this form and/or attachments; use clips.*

**Change Order No.** _____
**Date:** _____
**DCM (BC) No.** _____

**(A)**

| PROJECT NAME & LOCATION: | OWNER ENTITY NAME & ADDRESS: |
|---|---|
| CONTRACTOR COMPANY NAME & ADDRESS: | ARCHITECTURAL / ENGINEERING FIRM NAME & ADDRESS: |

**(B)** DESCRIPTION OF PROPOSED CHANGE(S): **ATTACH CONTRACTOR'S DETAILED COST PROPOSAL(s)**

**AMOUNT:** ☐ ADD ☐ DEDUCT $_____ **TIME EXTENSION:** _____ **CALENDAR DAYS**

**(C)**

| ORIGINAL CONTRACT AMOUNT | | PREVIOUS C.O.'s _____ THRU _____ | | CONTRACT AMOUNT PRIOR TO PROPOSED CHANGE ORDER |
|---|---|---|---|---|
| $_____ | + | $_____ | = | $_____ |

**(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 |
|---|---|
| _____ ARCHITECTURAL / ENGINEERING FIRM NAME | _____ LOCAL OWNER ENTITY NAME |
| By: _____ ARCHITECT / ENGINEER'S SIGNATURE | By: _____ OWNER'S SIGNATURE |
| By: _____ OWNER'S PROJECT REPRESENTATIVE'S SIGNATURE | By: _____ OWNER'S LEGAL COUNSEL'S SIGNATURE |

# 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. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to the Division of Construction Management (DCM).

## 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 Form B-11: CHANGE ORDER JUSTIFICATION must accompany the proposed DCM Form C-12: Change Order. Instructions for completing the B-11 form are:

1. Insert the proposed Change Order Number, date of the Justification, and DCM (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. If the cumulative change order amount exceeds 10% of the original contract amount then the Owner's legal consultant must sign the Change Order Justification prior to submission to DCM.**

*Do not staple this form and/or attachments; use clips.*

# GENERAL CONTRACTOR'S ROOFING GUARANTEE

DCM (BC) Project No. _____

| Project Name & Address | Project Owner Entity(ies) Name(s) & Address(es) |
|---|---|
| | |

| General Contractor's Company 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 _____, _____.

_____

General Contractor's Authorized Signature

_____

Typed Name and Title

# GENERAL CONTRACTOR'S FIVE YEAR BUILDING ENVELOPE GUARANTEE

| **Project Name and Address:** | **Owner's Name and Address:** |
|---|---|
| **Architect's Name and Address:**<br><br>LATHAN ASSOCIATES ARCHITECTS, P.C.<br>300 Chase Park South, Suite 200<br>Hoover, AL 35244<br><br>Architect's Job No.:_____ | **General Contractor's Name, Address, and Phone No.:** |
| EFFECTIVE DATES OF GUARANTEE: Start: _____ (Date of Substantial Completion) Period: Five (5) Years | |

General Contractor warrants to the Owner (named above) for a period of Five Years the entire Building Envelope will be weathertight, moisture and wind impermeable and uncompromised as a result of materials and/or workmanship provided. Should any portion of the Building Envelope develop moisture and/or wind infiltration during the warranty period, the General Contractor shall promptly address, employ clean-up and temporary measures to prevent further resultant damage and provide corrections to the Building Envelope and/or consequently damaged work of such quality consistent with the original scope of work as deemed by the Architect. Corrective work shall be subject to special scheduling as required to prevent disruption of the Owner's ongoing operations and shall be subject to the same General Conditions and work ethics as required for the original work.

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 and any damage caused by such addition. If this contract is for an addition to an existing building, then this guarantee covers the work involved at the point of connection.

Upon discovery, the Owner shall promptly notify the General Contractor of observed or suspected compromises and shall afford reasonable opportunity for the General Contractor to inspect the work, and to examine the evidence of such.

The General Contractor shall be afforded reasonable and scheduled opportunity to make periodic preventative observations of the work associated with this warranty.

This Building Envelope Warranty shall be effective concurrently with the required DCM Form C-9 General Contractor's Roofing Guarantee and both shall be submitted fully executed as independent documents to the Architect at the time of the Final Inspection.

This instrument has been duly executed this day of_____, 20 .

_____
General Contractor's Authorized Signature

_____
Typed Name and Title

TO: **Alabama Department of Finance**
**Real Property Management**
**Division of Construction Management**
770 Washington Avenue, Suite 444
Montgomery, AL 36130-1150
(334) 242-4082

*Do not staple this form and/or attachments; use clips.*
*Print single-sided; do not submit double-side printed documents.*

DCM Form C-13
Revised November 2022;
(Note: Use DCM Form C-13A for fully locally-funded K-12 & Public 4-Year University Capital Improvement, HVAC, & Roof Projects with both a total cost of $750,000 or Less and a contract awarded on or after 10/01/22)

# CERTIFICATE OF SUBSTANTIAL COMPLETION

***ROUTING PROCEDURES*** *ON NEXT PAGE*

**DCM (BC) No.** _____

| **OWNER ENTITY NAME AND ADDRESS:** | **ARCHITECTURAL / ENGINEERING FIRM NAME AND ADDRESS:** |
|---|---|
| Email to receive executed copy: _____ | Email to receive executed copy: _____ |
| **CONTRACTOR COMPANY NAME AND ADDRESS:** | **BONDING COMPANY NAME AND ADDRESS:** |
| Email to receive executed copy: _____ | Email to receive executed copy: _____ |
| **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 shall be routed for signature. DCM office will mail the fully-executed original to the Owner and email copies to all parties.**

| | |
|---|---|
| **RECOMMENDED BY** *(signature and email address required)*: | |
| ARCHITECT/ENGINEER: _____ | DATE: _____ |
| **CONTRACTING PARTIES:** | |
| CONTRACTOR: _____ | DATE: _____ |
| OWNER: _____ | DATE: _____ |
| _____ | DATE: _____ |
| **APPROVALS:** | |
| DCM INSPECTOR: _____ | DATE: _____ |
| DCM CHIEF INSPECTOR: _____ | DATE: _____ |
| DCM DIRECTOR: _____ | DATE: _____ |

# CERTIFICATE OF SUBSTANTIAL COMPLETION ROUTING PROCEDURE

**Only one (1) originally executed substantial completion form shall be routed for signature. DCM office will mail the fully-executed original to the owner and email copies to all parties.**

**ARCHITECT/ENGINEER:** Sign and date document, then mail it to Contractor. Provide Owner with DCM Inspector's name & field office address; territories and addresses are available at www.dcm.alabama.gov/staff.aspx.

**CONTRACTOR:** Sign and date document, then mail it to Owner.

**OWNER:** Sign and date document, then mail it to DCM Inspector's field office address; DCM Inspector territories and addresses are available at www.dcm.alabama.gov/staff.aspx.

**DCM INSPECTOR:** Sign and date document, then mail it to DCM Montgomery office.

**DCM OFFICE:** After review and signature/date by DCM Chief Inspector and DCM Director, DCM office will mail the fully-executed original document to Owner and will email copies to all parties.

## NOTICE

**THE EXECUTED "GENERAL CONTRACTOR'S ROOFING GUARANTEE" (DCM Form C-9) AND ANY OTHER ROOFING WARRANTY REQUIRED BY THE CONTRACT MUST ACCOMPANY THIS CERTIFICATE TO OBTAIN DCM APPROVAL.**

Also, any 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.

# SAMPLE FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, as amended, notice is hereby given

that _____,
(*Contractor Company Name*)
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 / Engineer*)

_____
(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 $50,000.00 or less, run one time only. A copy of the publisher's affidavit of publication (including a copy of the advertisement) shall be submitted by the Contractor to the Design Professional for inclusion with DCM Form B-13: Final Payment Checklist for state agencies, PSCA-funded and other bond-funded projects.

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

# Contractor's Affidavit of Payment of Debts and Claims

| **To Owner** (*Entity name and address*): | **Project** (*Same as appears in the Construction Contract*): |
|---|---|
| | |

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Construction Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. DCM Form C-20, Consent of Surety to Final Payment, may be used for this purpose.

   Indicate attachment: ☐ Yes ☐ No

The following supporting document should be attached hereto if required by the Owner:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.
3. Contractor's Affidavit of Release of Liens, DCM Form C-19.

**Contractor** (*Insert company name and address*):

By: _____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

# Contractor's Affidavit of Release of Liens

| **To Owner** (*Entity name and address*): | **Project** (*Same as appears in the Construction Contract*): |
|---|---|
| | |

STATE OF:

COUNTY OF:

The undersigned hereby certifies that, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Construction Contract referenced above.

EXCEPTIONS:

Supporting Documents Attached Hereto:

1. Contractor's Release of Waiver of Liens.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment supplies, to the extent required by the Owner, accompanied by the list thereof.

**Contractor** (*Insert company name and address*):

By: _____
Signature of authorized representative

_____
Name and Title

Sworn to and subscribed before me this _____ day

of _____, _____.

_____
Notary Public's Signature

My commission expires: _____

Seal:

DCM (BC) Number: _____

PSCA Projects: PSCA Number: _____

Date of the Construction Contract: _____

Surety's Bond Number: _____

# CONSENT OF SURETY TO FINAL PAYMENT

| **To Owner** (*Entity name and address):* | **Project** (*Same as appears in the Construction Contract*)**:** |
|---|---|
| | |

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the

**Surety** (*Insert name and address of Surety*)

on bond of

**Contractor** (*Insert name and address of Contractor*)

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to

**Owner** (*Insert name and address of Entity*)**:**

as set forth in said Surety's bond.

**SIGNED AND SEALED** this _____ day of _____, _____.

**SURETY:**

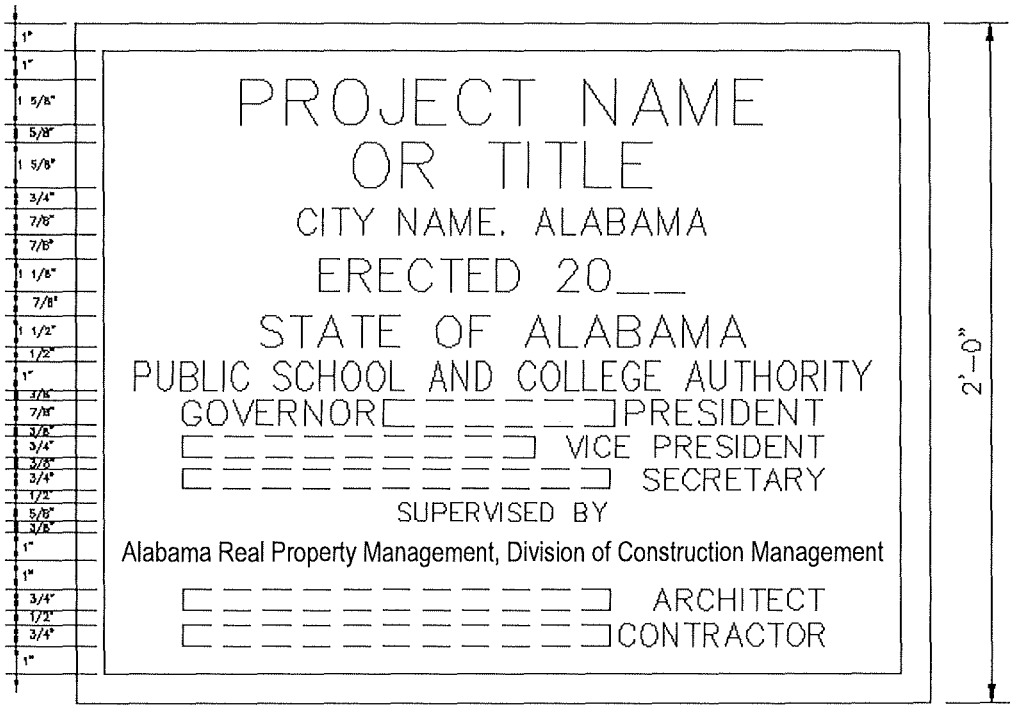
_____ Seal:
Company Name

By _____
Signature of Authorized Representative

_____
Printed Name and Title

Note: Original Power of Attorney for the Surety's signatory shall be furnished with each of the original forms to be attached to each of the four (4) final payment forms.

# Detail of PSCA Plaque

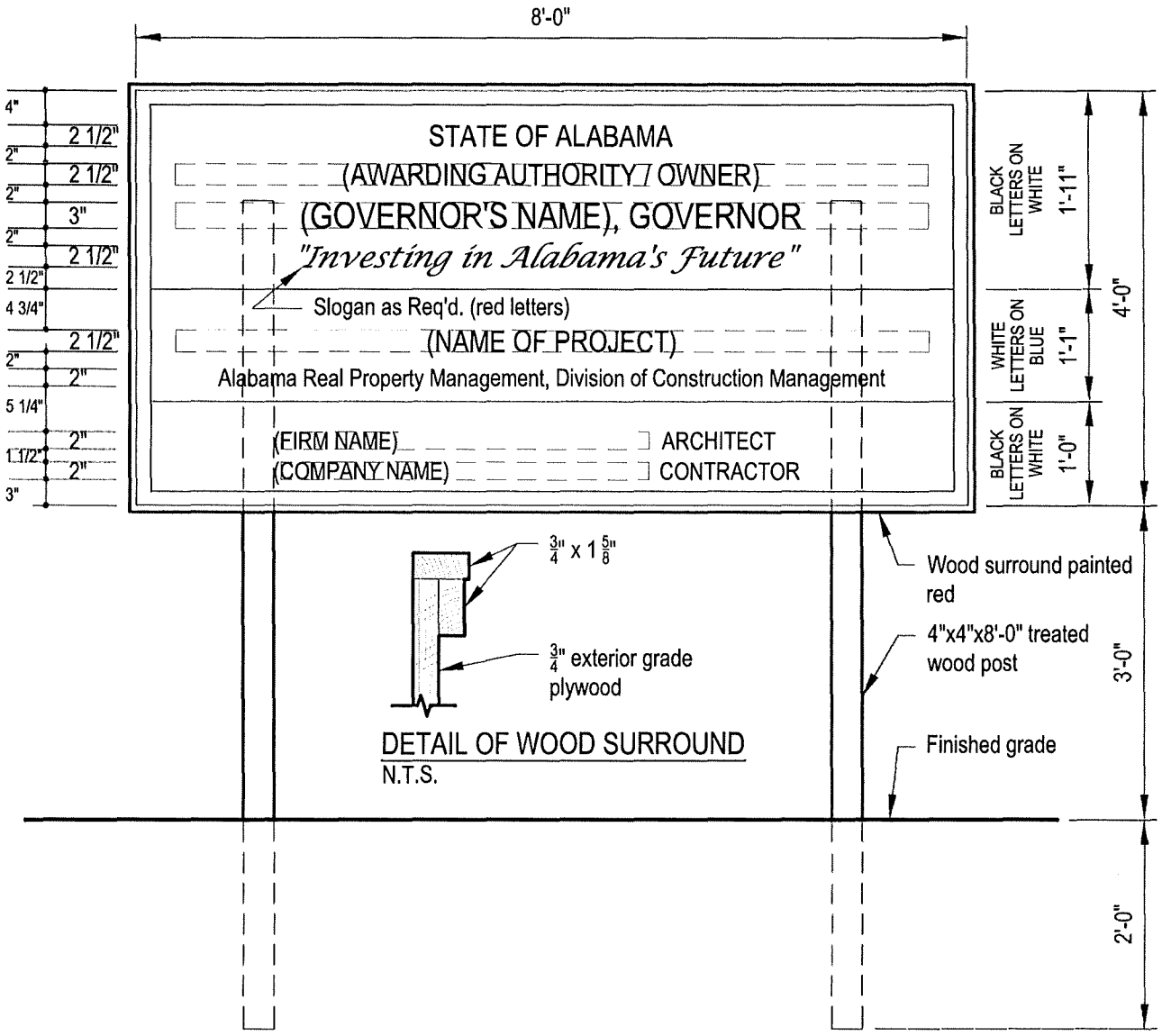



**Notes:**

1. PSCA plaques are installed as a permanent part of a building and are required on the following partially or fully PSCA-funded projects: Major renovations, renovations of four (4) or more rooms, and all new construction as follows: buildings, additions, and athletic facilities. DCM Form 9-M must be included in the project manual of such projects. Exception: Alabama Community College System (ACCS) PSCA-funded projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.
2. PSCA plaques are not required on the following partially or fully PSCA-funded projects: Sitework, paving, parking lots, utility work, re-roofing, and finishes (such as painting). DCM Form 9-M should not be included in the project manual of such projects.
3. The erection year is the year the project is completed.
4. Guidance for determining the names of PSCA officials:
   The PSCA President is the current Governor of Alabama.
   The PSCA Vice President is the current State Superintendent of Education.
   The PSCA Secretary is the current Director of the Alabama Department of Finance.

# DETAIL OF PROJECT SIGN

N.T.S.




DETAIL OF WOOD SURROUND
N.T.S.

Notes:

1. Fully locally-funded State Agency and Public University projects: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
   Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner, if project sign is requested by Owner, include DCM Form C-15 in the project manual.
   Partially or fully PSCA-funded projects: DCM Form C-15 must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of contract sum. "Alabama Public School and College Authority " as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects. Exception: Alabama Community College System (ACCS) PSCA-funded projects with Notice-To-Proceeds issued after July 31, 2021 are not submitted to DCM.
   Fully locally-funded ACCS projects with Notice-To-Proceeds issued prior to August 1, 2021: DCM Form C-15 must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign.
2. Sign to be constructed of ¾" exterior grade plywood.
3. Paint with two 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 the unpainted exterior grade plywood.
4. Sign shall be placed in a prominent location and easily readable from existing street or roadway.
5. Sign shall be maintained in good condition until project completion.
6. Slogan: Act 2020-167's title *"Investing In Alabama's Future"* should be placed on the project signs of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

## DCM CODE SUPPLEMENT FOR STORM SHELTERS

### Labeling of Storm Shelter Doors, Windows, Shutters, and Impact Protective Systems

All openings in storm shelter enclosures requiring a rating shall be protected by assemblies which include doors, frames, hardware, closing devices, windows, shutters, louvers, anchorage, sills, etc., installed in accordance with ICC 500, ICC/NSSA Standard for the Design and Construction of Storm Shelters.

To further clarify the basic requirements and/or the correct method of labeling that will be acceptable to the Alabama Division of Construction Management, the labels shall include the following:

1. Accessibility: Each component shall bear a label located to be accessible after installation.

2. Permanence: Each component shall bear a label of a type of material and be so attached that the life of the label and the attachment thereof can reasonably be expected to equal the life of the component to which it is attached. Labels shall be raised or embossed on metal labels or stamped into metal frames. Plastic or paper labels are unacceptable.

3. Legibility: The label design shall be such that it can always be visible and legible and must be clean of any paint or other coverage making the label illegible.

4. Fire Resistance: All approved labels on doors and on frames shall include thereon the fire resistance rating in hours and minutes for which the door or frame is labeled. Labels on frames with transoms or sidelights must identify that the opening assembly includes same.

5. Other Requirements: The labels or stamps applied to frames, etc., must be provided by a manufacturer that has had their products tested in accordance with ICC 500 Chapter 8. Product specimens shall have passed the testing requirements of ICC 500 Chapter 8 as conducted by a third party, nationally recognized accredited and approved testing laboratory. The testing laboratory shall maintain ongoing periodic inspections of the products it has tested to confirm continued compliance.

# STATE OF ALABAMA
# DEPARTMENT OF FINANCE
# REAL PROPERTY MANAGEMENT
## Division of Construction Management

Kay Ivey
Governor

Kelly Butler
Director of Finance

P.O. Box 301150, Montgomery, AL 36130-1150
770 Washington Avenue, Suite 444, Montgomery, AL 36104
Telephone: (334) 242-4082 Fax: (334) 242-4182

Mickey Allen
Assistant Finance Director
Real Property Management

Frank Barnes, Director
Construction Management


February 18, 2021

**TO:** **PUBLIC K-12 SCHOOL SUPERINTENDENTS, FACILITY MANAGERS, ARCHITECTS AND ENGINEERS**

**FROM:** **MICKEY ALLEN, ASSISTANT FINANCE DIRECTOR**
**ALABAMA REAL PROPERTY MANAGEMENT (RPM)**

**FRANK BARNES, DIRECTOR**
**ALABAMA DIVISION OF CONSTRUCTION MANAGEMENT (DCM)**

**SUBJECT:** **UPDATED GUIDANCE ON TORNADO STORM SHELTER REQUIREMENTS FOR PUBLIC K-12 SCHOOLS SUBJECT TO ACT 2010-746**

DCM's July 29, 2010 memorandum *Additional Guidance on Safe Space Requirements* is superseded by this February 18, 2021 bulletin which includes updated references, terms, and details. Per the intent of the original memo, this bulletin is being issued to provide public K-12 school architects, engineers and owners additional guidance on the requirements and interpretation of the ICC 500 for public school projects subject to Act 2010-746. (Guidance on storm shelters for private K-12 school projects subject to the requirements of ICC 500 are addressed in DCM's bulletin dated 10/21/20 available on www.dcm.alabama.gov.)

1. **Occupant Load (Para. 501.1.1).** Each new public school shall include a tornado storm shelter of sufficient size to accommodate the student occupant load plus an additional 10% increase for faculty and administration. The student occupant load shall be calculated at 1 student per 30 SF of gross classroom area. Fractions or portions shall be rounded up to whole numbers. Classroom area must include all rooms designated for general classroom instruction (for example: special education, art, computer lab, science lab, etc.). Auxiliary support areas such as cafeterias, band practice rooms, gymnasiums, etc. do not have to be included as general classroom instruction area.

2. **Tornado Storm Shelter Design Information (Para. 107.2.1 and 107.2.6).** The plan submittal shall include a Tornado Storm Shelter Plan (similar to the Life Safety Plan) with the design information required per these ICC 500 sections. In addition, the tornado storm shelter plan shall include the maximum number of occupants (seating/standing and wheelchair bound), the number and location of required toilet and handwashing facilities (if applicable), the maximum travel distance to the shelter and accessible route, location of emergency escape openings, locations of all required signage, location of fire extinguishers and first aid kits (if applicable), and indicate the 2-hour firewalls.

3. **Tornado Wind Speed Determination (Para. 304.2).** A state map with counties is attached that approximates the shelter design wind speeds as illustrated in Figure 304.2(1). The map is provided as a guide, but the design professional must use their professional judgment when determining the appropriate design criteria. The design wind speed must be indicated on the Tornado Storm Shelter Plan and on the required tornado storm shelter signage.

4. **Labeling of Shelter Openings (Para. 108.2).** The glazing or glazing systems, and opening protectives used for the storm shelter area shall have been successfully tested for the identified hazard criteria for tornados. Verify that the testing method complies with ICC-500. Label required. ICC 500 Section 804.9.4. The labels or stamps applied to frames, etc., must be provided by a manufacturer that has had their products tested in accordance with ICC 500 Chapter 8. Product specimens shall have passed the testing requirements of ICC 500 Chapter 8 as conducted by a third party, nationally recognized, accredited and approved testing laboratory. The testing laboratory shall maintain ongoing periodic inspections of the products it has tested to confirm continued compliance.

5. **Labeling of Fire Barriers (Para. 601.1).** All 2-hour fire barriers shall be permanently identified with signs or stenciling in accordance with the applicable building code. Refer to Chapter 2 of the Division of Construction Manual of Procedures.

6. **Shelter Signage (Para. 108.1).** In addition to the type of shelter, name of builder or manufacturer and the design wind speed, the shelter sign shall also include the maximum occupant load capacity.

7. **Peer Review (Para. 106.1.1).** Third party peer reviews are required with the final construction document submittal and for final approval. See ICC 500-2014 Section 106.1.1. Peer reviews are required for the requirements listed in chapters 3, 5, 6 and 7. Note that issues which may be raised by the peer reviews must be addressed prior to submittal of final documents. Peer reviews must be sealed, (signed and dated as may be required) by design professionals (architects, mechanical, electrical and structural engineers) licensed to practice in the State of Alabama.

8. **Mandatory Design Professional's Statement (Para. 106.4).** The attached DCM Form B-14: Certification of Structural Observations must be completed by the architect or structural engineer of record and submitted to the Division of Construction Management Inspector at the Final Inspection. The completed form must also be submitted as an attachment to the Certificate of Substantial Completion.

9. **Mandatory Contractor's Statement (Para. 107.3.3).** The attached DCM Form C-17: Contractor's Statement of Responsibility for Construction of Tornado Storm Shelter (Hurricane Shelter Where Applicable) must be completed by the contractor and submitted to the Division of Construction Management Inspector prior to the start of construction. A copy of the Quality Assurance Plan as prepared by the Design Professional must be attached to the Contractor's Statement.

10. **Special Inspections (Para. 107.2.4).** A list of Special Inspections required for the project must be submitted to the Division of Construction Management Inspector at the Pre-Construction Conference.

11. **Location of Tornado Storm Shelter.** It is highly recommended that the tornado storm shelters be adequately dispersed to minimize travel times and located within the same structure when possible to avoid travel outside the building during inclement weather. The ideal travel time is 5-10 minutes and the maximum recommended travel time should be no more than 15 minutes. The travel time should consider the time required to organize the students, gather belongings, and proceed in an orderly fashion to the tornado storm shelter. In addition, tornado storm shelters should be located or dispersed so that they are accessible from areas that are likely to be used outside of school hours, such as band practice rooms, field houses, gymnasiums and similar areas.

12. **Emergency Communication.** It is recommended that tornado storm shelters include some form of reliable emergency communication. Cellular phone communication is not considered reliable since cell towers may be affected by a storm and/or the volume of calls.

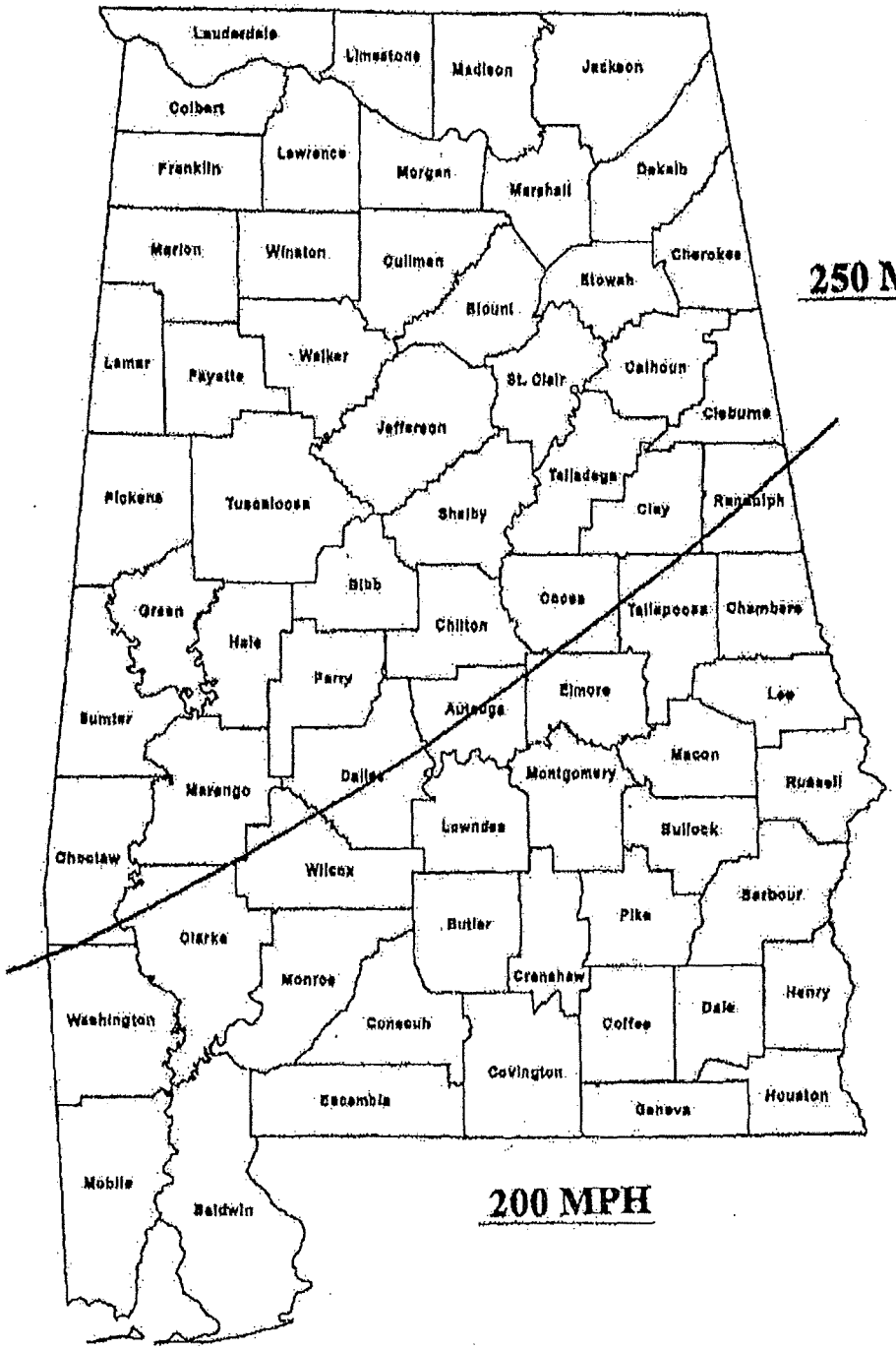
If you have any questions, please contact DCM's Plan Review Division at 334-242-4082 or planreview@realproperty.alabama.gov.

Cc: Perry Taylor, State School Architect, State Department of Education

# ATTACHMENT A

## STATE MAP WITH COUNTIES SHOWING APPROXIMATE TORNADO WIND SPEED ZONES

(Refer to ICC 500, Figure 304.2(1) for official map)



ATTACHMENT C
DESIGN INFORMATION SHELTER SIGNAGE

# TORNADO STORM SHELTER

____ MPH STORM SHELTER DESIGN WIND SPEED (3-SECOND GUST)

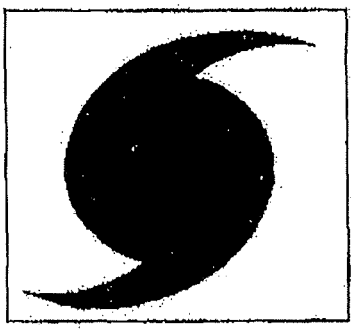
MISSILE IMPACT RESISTANCE:

____ LBS. 2 X 4 @ ___ MPH (HORIZONTAL)

____ LBS. 2 X 4 @ ___ MPH (VERTICAL)

STORM SHELTER MANUFACTURER/BUILDER _____

MAXIMUM OCCUPANT LOAD _____



# COMBINATION STORM SHELTER

____ MPH STORM SHELTER DESIGN WIND SPEED (3-SECOND GUST)

MISSILE IMPACT RESISTANCE:

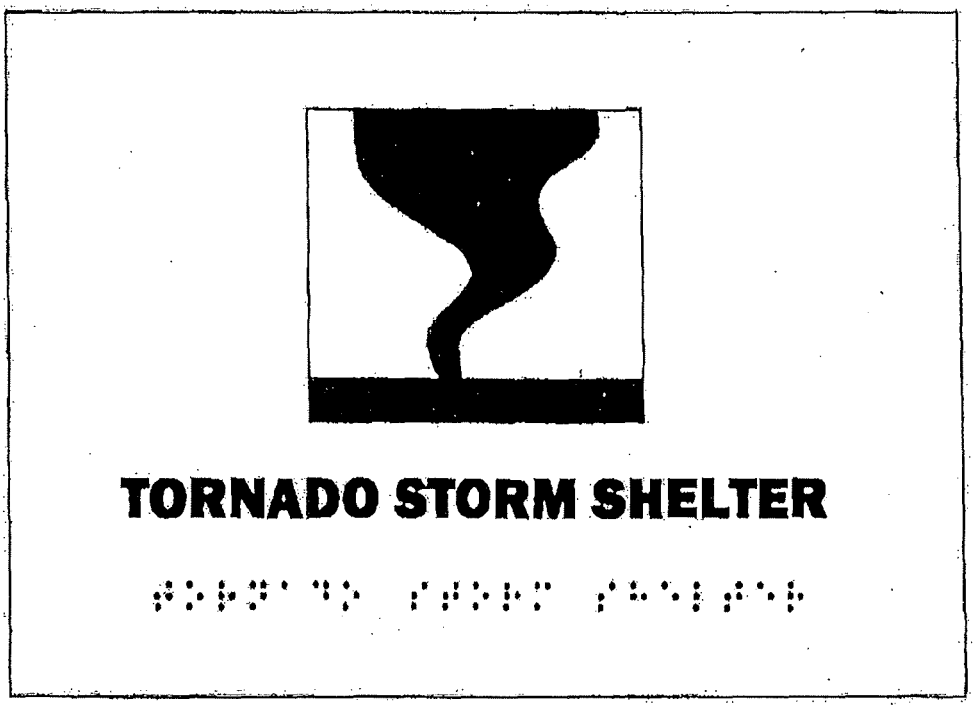
____ LBS. 2 X 4 @ ___ MPH (HORIZONTAL)

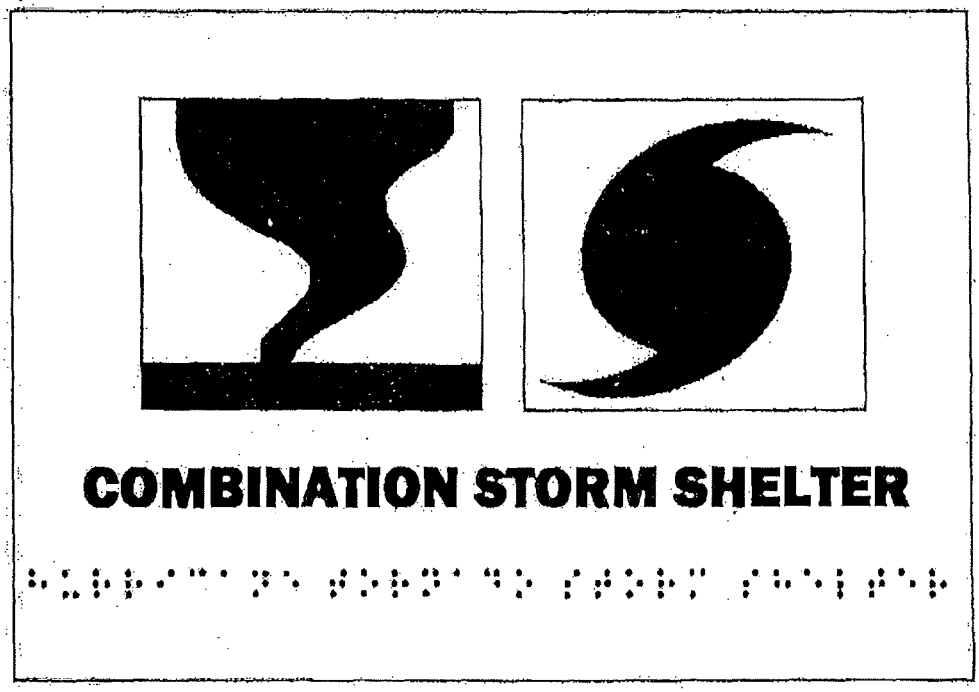
____ LBS. 2 X 4 @ ___ MPH (VERTICAL)

STORM SHELTER MANUFACTURER/BUILDER _____

MAXIMUM OCCUPANT LOAD _____

ATTACHMENT D
SHELTER LOCATION SIGNAGE




Sign shall be no smaller than 8 ½" x 11"and shall be both tactile and visual.

DCM (BC) No. _____

# CERTIFICATION OF STRUCTURAL OBSERVATIONS

for

Project Name: _____

Owner Entity: _____

Contractor Company: _____

I _____, do hereby verify that I have personally conducted the visual
Design Professional
observations of the construction of the structural system for conformance to the approved construction documents for the referenced project. The visual observations of the structural systems were personally conducted by me at all significant construction stages and at the completion of the construction of the structural system. To the best of my knowledge, all structural deficiencies have been resolved except as noted below:

Signed and sealed on this date, _____, 20____. Design Professional's Seal:

_____
Architectural / Engineering Firm

_____
Signature of Architect or Structural Engineer of Record

_____
Printed Name

---

**Specifications:** This form must be included in the project manual submitted to DCM for Final Plan Review for:

- All new public K-12 schools, awarded after July 1, 2010, with tornado storm shelters as required by Act 2010-746.
- All public K-12 additions and renovations which are required to contain tornado storm shelters by the International Building Code, Section 423.
- All private K-12 new schools, additions and renovations as required by the International Building Code, Section 423.
- All new buildings containing classrooms or dorm rooms on the grounds of all public 2-year or 4-year institutions of higher education, statewide, awarded on or after August 1, 2012, as required by Act 2012-554.

**Submittal of Form:** Provide a copy of the completed form to the DCM Inspector at Final Inspection. The original completed form, signed and sealed by the architect or structural engineer of record, must be submitted as an attachment to the Certificate of Substantial Completion for:

- All new buildings constructed on the grounds of new public K-12 schools awarded after July 1, 2010.
- All new buildings containing classrooms or dorm rooms constructed on the grounds of all public 2-year or 4-year institutions of higher education awarded on or after August 1, 2012.

DCM (BC) No. _____

# CONTRACTOR'S STATEMENT OF RESPONSIBILITY FOR CONSTRUCTION OF TORNADO STORM SHELTER (HURRICANE SHELTER WHERE APPLICABLE)

Project Name: _____

Owner Entity: _____

Architectural/Engineering Firm: _____

Contractor Company: _____

I _____, acknowledge that I am responsible to the Owner, the Alabama
General Contractor
Division of Construction Management, the Alabama Community College System or the State Department of Education as applicable, and the Architect/Engineer for the construction of the main wind-force resisting system and any other components listed in the **attached Quality Assurance Plan (QAP).**

I acknowledge that I am aware of the special requirements contained in the QAP.

I certify that control will be exercised to obtain compliance with the construction documents. The procedures for exercising control shall be as listed below:

| Control Procedure | How Reported | Distributed To | Distribution Frequency |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

(Attach additional pages if needed)

Furthermore, the following persons will be responsible for exercising control in accordance with the QAP. Any changes to the persons listed below will be coordinated with the Owner a minimum of 3 calendar days in advance of the change. The Owner shall provide written objections to the changes within 10 calendar days. No response shall be deemed acceptance.

| Name of Person | Responsibility for QAP |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Signed on this date, _____, 20____.

_____
Contractor Company

By: _____
Signature of Contractor

Name and Title: _____

---

**Specifications:** This form must be included in the project manual submitted to DCM for Final Plan Review for:

- All new public K-12 schools, awarded after July 1, 2010, with tornado storm shelters as required by Act 2010-746.
- All public K-12 additions and renovations which are required to contain tornado storm shelters by the International Building Code, Section 423.
- All private K-12 new schools, additions and renovations as required by the International Building Code, Section 423.
- All new buildings containing classrooms or dorm rooms on the grounds of all public 2-year or 4-year institutions of higher education, statewide, awarded on or after August 1, 2012, as required by Act 2012-554.

**Submittal of Executed Form:** The completed and signed form must be submitted to the DCM Inspector at the pre-construction conference for:

- All new buildings to be constructed on the grounds of new public K-12 schools awarded after July 1, 2010.
- All new buildings containing classrooms or dorm rooms to be constructed on the grounds of all public 2-year or 4-year institutions of higher education awarded on or after August 1, 2012.

# 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 DIVISION OF CONSTRUCTION MANAGEMENT:** The Technical Staff of the Alabama Division of Construction Management.

**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. COMMISSION:** The former Alabama Building Commission, for which the Alabama Division of Construction Management has been designated by the Legislature as its successor.

**D. 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)

**E. 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.

**F. 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.

**G. 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.

**H. DCM:** The Alabama Division of Construction Management.

**I. DCM PROJECT INSPECTOR:** The member of the Technical Staff of the Alabama Division of Construction Management to whom the Project is assigned relative to executing the respective inspections and authorities described in Article 16, Inspection of the Work.

**J. 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.

**K. DIRECTOR:** The Director of the Alabama Division of Construction Management.

**L. 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.

**M. 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.

**N. 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.

**O. 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.

**P. 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.

**Q. 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.

**R. 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.

**S. 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)** Any portions of the Contract Documents written in longhand must be initialed by all parties..

**(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, DCM 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 DCM Form C-11, "Sample 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, it may be used in lieu of DCM Form C-11.

**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, DCM 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, DCM 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 DCM Project Inspector as a representative of the Alabama Division of Construction Management.

**(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 DCM Project Inspector, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers, and the DCM 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 DCM 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 DCM 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 DCM 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 DCM PROJECT INSPECTOR

**(1)** The DCM 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 DCM Project Inspector shall have the authority to:

**(a)** reject Work that is not in compliance with the State Building Code adopted by the DCM, unless the Work is in accordance with the Contract Documents in which case the DCM 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 DCM Project Inspector.

**(3)** The DCM 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 DCM 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 DCM Project Inspector will be transmitted to the Owner, Contractor, and Architect.

**(4)** The DCM 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 DCM 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.

**(7)** All change orders require DCM Form C-12: Contract Change Order and DCM Form B-11: Change Order Justification. Only Change Orders 10% or greater of the current contract amount require the Owner's legal advisor's signature on DCM Form B-11: Change Order Justification.

## 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%. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** 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. **Changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.** 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, DCM 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

DCM Form C-10SOV, 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 printable on 8.5" × 11" for DCM's scanning purposes 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 DCM Form C-10, Application and Certificate 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. One payment application per month may be submitted. Each DCM Form C-10, Application and Certificate for Payment shall match to the penny and be accompanied by an attached DCM Form C-10SOV, Schedule of Values.

**(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 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.

**(4)** Two copies of DCM Form C-10, Application and Certificate for Payment containing original signatures, with each copy of DCM Form C-10 to include all attachments, shall be submitted to DCM for review following the Contractor's, Notary's (for paper submittals), Architect's and Owner's signatures.

## 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 to the Owner 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 Division of Construction Management.

**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 Division of Construction Management.

**(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 Division of Construction Management 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, DCM 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 Division of Construction Management 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. Architect prepares DCM Form B-13: Final Payment Checklist and forwards it to the Owner along with the final Application for Payment.

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

**(6)** Delivery by the Contractor to the Owner through the Architect of DCM Form C-18:

Contractor's Affidavit of Payment of Debts and Claims, and a Release of Claims, if any, 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 to Final Payment, if any, to Contractor. This Consent of Surety is required for projects which have Payment and Performance Bonds.

(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.

(9) See Manual of Procedures Chapter 7, Section L.7 concerning reconciliation of contract time, if any.

## 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 DCM Project Inspector, or **(2)** their resolution under Article 18, Deductions for Uncorrected Work.

## C. ADVERTISEMENT for COMPLETION

**(1) If the Contract Sum is $50,000 or less:** 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 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 shall be made by the Contractor to the Architect by affidavit of the publisher, in duplicate, 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 inspection must be scheduled with the Owner, Architect and DCM Inspector. 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" (DCM 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 Division of Construction Management.

**(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 Division of Construction Management.

**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 Division of Construction Management, 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

*(Provide entire Article 37 to Contractor's insurance representative.)*

### 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 Division of Construction Management, 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 Division of Construction Management, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

**(4) COMMERCIAL UMBRELLA OR COMMERCIAL EXCESS LIABILITY INSURANCE**

**(a)** Commercial Umbrella or Commercial Excess 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 Umbrella or Commercial Excess Limits of:

**.1** $ 5,000,000 per Occurrence

**.2** $ 5,000,000 Aggregate

**(c)** Additional Requirements for Commercial Umbrella or Commercial Excess Liability Insurance:

**.1** The policy shall name the Owner, Architect, Alabama Division of Construction Management, 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 or Excess 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. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk 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 not be applicable to loss or damage that occurs after final acceptance of the Work.

# ARTICLE 38
# 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 (P&P Bonds), DCM Forms C-6 and C-7 as contained in the Project Manual, 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 amount. There shall be three original P&P Bonds submitted with original signatures for each of the three contracts required. The P&P bonds must be signed either on the same day or after the construction contract date. Each P&P Bond shall have attached thereto an original power of attorney (POA) of the signing official. The POA signature date must be the same day as the P&P Bond's signature date. All signatures must be present.

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 Division of Construction Management, 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 Owner, 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.

### D. ALABAMA IMMIGRATION LAW

Per ACT 2011-535 as codified in Title 31, Chapter 13 of the Code of Alabama, 1975, as amended:

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.

**E. ALABAMA BOYCOTT LAW**

Per Act 2016-312as codified in Title 41, Chapter 16, Article 1, of the Code of Alabama, 1975, as amended:

The contracting parties affirm, for the duration of the agreement, that they are not currently engaged in, and will not engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which this state can enjoy open trade.

**F. ACCOUNTING OF SALES TAX EXEMPT PROJECTS**

Per Act 2013-205 as codified in Title 40, Chapter 9, Article 1, of the Code of Alabama, 1975, as amended:

In bidding the work on a tax exempt project, the bid form shall provide an accounting for the tax savings.

## 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 Division of Construction Management, 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

**A.** Fully locally-funded State Agency and Public Higher Education projects: DCM Form C-15: Detail of Project Sign must be included in the project manual regardless of expected bid amount. If the awarded contract sum is $100,000.00 or more, Contractor shall furnish and erect a project sign. Other conditions besides the contract sum may warrant waiver of this requirement, but only with approval of the Technical Staff.

**B.** Fully locally-funded K-12 school projects: Project sign is not required unless requested by Owner; if project sign is requested by Owner, include DCM Form C-15: Detail of Project Sign in the project manual.

**C.** Partially or fully PSCA-funded projects: DCM Form C-15: Detail of Project Sign must be included in the project manual. Contractor shall furnish and erect a project sign for all PSCA-funded projects, regardless of the contract sum. "Alabama Public School and College Authority" as well as the local owner entity must be included as awarding authorities on the project sign of all PSCA-funded projects.

When required per the above conditions, 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 project sign is required, which shall be erected on one of the sites in a location selected by the Architect and Owner. Slogan: The title of the current PSCA Act should be placed on the project sign of all PSCA-funded projects, otherwise the Awarding Authority/Owner's slogan, if any, should be used. If the Awarding Authority/Owner of a fully locally-funded project does not have a slogan, the project sign does not require a slogan.

END of
GENERAL CONDITIONS of the CONTRACT

## 1.0 - GENERAL

### 1.1 Summary

A. This Section includes administrative and procedural requirements for alternates.

1. Before submitting proposals, Bidders shall read entire specifications, including all divisions, and familiarize themselves with requirements respecting all Alternates, and also how each section of the work is affected by acceptance or omission of Alternates.

2. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

3. Bidders shall state on the Bid Form the amount to amend the Base Bid for making the following changes, including all incidental omissions, additions, and adjustments as may be necessary or required by such changes

B. The Owner will award the Alternates in accordance with and as stated in The DCM Instructions to Bidders, 15. A - D and located at the front of this Project Specification Manual.

C. Before signing the Contracts, the successful Contractor should be familiar with all Alternates and requirements. After signing the contracts, there will be no allowance or extra compensation paid to the Contractor because of omission or ignorance of said requirements.

### 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 the 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. Execute accepted alternates under the same conditions as other work of the Contract.

1.4 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.

ALTERNATE PRICES ARE REQUIRED AS FOLLOWS:

None at this time.

END OF SECTION

## 1.0 - GENERAL

1.1 Related Documents

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

1.2 Summary

A. This Section specifies administrative and procedural requirements governing handling and processing allowances.

Selected materials, services and equipment, and in some cases, their installation is shown and specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials, services and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order. **Allowances indicated shall be included in the Base Bid or Alternates as indicated.**

B. Types of allowances required include the following:

1. Lump sum allowances.
2. Contingency allowance.

C. Procedures for submitting and handling Change Orders are included in the General Conditions of the Contract, Article 43.

1.3 Selection and Purchase

At the earliest feasible date after Contract award, advise the Architect of the date when the final selection and purchase of each service, product or system described by an allowance must be completed in order to avoid delay in performance of the Work.

A. When requested by the Architect, obtain proposals for each allowance for use in making final selections; including recommendations that are relevant to performance of the Work.

B. Purchase products and systems as selected by the Architect from the designated supplier.

C. Specific service providers, i.e., geotechnical and landscaping, shall be selected by the Owner.

1.4 Submittals

A. Submit proposals for purchase of products or systems included in allowances. Reduction and addition in allowances shall be in the form specified for Change Orders.

B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 Contingency Allowances

A. Use the contingency allowance only as directed for the Owner's purposes, and only by written approval which designate amounts to be charged to the allowance.

B. **With the exception of quantity allowances, all allowances indicated are contingency allowances and therefore the Owner may transfer balances for other discretionary uses. Overhead and profit margins SHALL NOT BE ADDED to any amount drawn from original Allowance(s) regardless of the indicated use.**

C. Invoicing Procedures:

1. Each contingency allowance shall be a "line item" on the Schedule of Values which is an attachment to the Application and Certificate for Payment as referenced in the "General Conditions of the Contract, Article 29.B".

2. A copy of actual invoices paid by the Contractor and used against the respective Allowance(s), shall be included with the General Contractor's Application for Payment. This will allow all parties to know the remaining balance of Allowance(s) at all times.

3. Overages:
Contractor shall submit to the Architect all costs associated with prior approved overages of Allowance(s). The Architect will prepare change order for these prior approved overages.

4. Unused Balance:
Prior to final Application of Payment, Contractor shall submit total costs associated with Allowance(s). These costs should correspond with Schedule of Values from previous Applications for Payment plus any new charges. The Architect will prepare a change order to credit unused amounts. All changes which involve a net credit to the Owner shall include fair and reasonable credits for overhead and profit on the deducted work, in no case less than 5%.

## 2.0 - PRODUCTS

Not applicable.

## 3.0 - EXECUTION

3.1 Inspection
Inspect products covered by an allowance promptly upon delivery for damage or defects.

3.2 Preparation
Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.3 Schedule of Allowances

Allowance No. 1: Include a contingency allowance of $50,000.00 for the Owner's use throughout the project for unforeseen conditions as directed by the Architect.

Allowance No. 2: Include a contingency allowance of $600.00 per thousand for the purchase of brick. Brick masonry installation and all associated materials shall be included under Base Bid.

Allowance No. 3: Include a quantity allowance of 50 cubic yards of replacement of unsuitable soils with compacted structural fill. This Base Bid grading shall include the required cutting and filling of the existing grade to the proposed subgrade elevation. Onsite Geotechnical engineer shall determine if unsuitable soils are present. Unit price is provided for the addition to or deletion from this assumed amount. Refer to Section 02300.

Allowance No. 4: Include a contingency allowance of $15,000.00 to provide Fire Department Radio Transponder.

END OF SECTION

## 1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary (Special) Conditions and Modifications and other Division - 1 Specifications Sections, apply to work of the Section.

1.2 Project / Work Identification

Project name is Classroom Addition for Margaret Elementary School

A. General Description:

1. In general, the project shall consist of selective demolition and new construction including, but not limited to:

   Site work, new single-level, concrete block wall construction, with brick veneer, aluminum windows and aluminum storefront system, TPO roof on composite deck system, interior concrete block wall and paint finish, acoustical tile ceiling, wall finishes, floor finishes, plus plumbing, mechanical and electrical work as required to perform the work under this Contract for Margaret Elementary School and to properly join, connect and finish the new work to bring all to final, finished completion in first class manner ready for use by the Owner, all in strict accordance with Contract Documents including plans and specifications as prepared by Lathan Associates Architects, P. C., Hoover, Alabama; and shall include the furnishing of all labor, materials, equipment and services necessary for the proper completion of the building and other work as called for in the drawings and / or specifications dated
   January 11, 2024.

2. The Base Bid shall include all work shown or specified.

3. See Section 01010 for Alternates.

4. See Section 01020 for Allowances.

5. It is the intent and requirement under this Contract to accomplish all demolition and preparation necessary to perform the Work under this Contract and to properly join, connect and finish the new work to bring all to final, finished completion in first class manner ready for use by Owner.

B. Contractor's Duties: Except as specifically noted, provide and pay for:

1. Labor, materials and equipment.

2. Tools, construction equipment and machinery.

3. Water, heat, conditioning and utilities required for construction shall be provided by the Contractor.

4. Other facilities and services necessary for the proper execution and completion of the Work. Including hoist if same required for access to site. Provide own telephone service and sanitary portable toilet facilities.

5. Secure and pay for permits, impact fees, government fees, and licenses. This will include, but not be limited to, all permits required by ADEM , the U.S. Army Corp of Engineers and all fees required by State of Alabama, Division of Construction Management.

6. Give required notices.

7. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of the Work.

8. Promptly submit written notice to the Architect of observed variance of Contract Documents from legal requirements. It is not Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations.

**9.** Enforce strict discipline and good order among employees. Do not employ unfit persons or persons not skilled in assigned tasks. **Smoking is prohibited on site.**

**10. Comply with Owner's Covid-19 safety measures, and requirements.**

11. It is intended that all items and systems shown or specified be furnished and installed complete and fully operational when all work is in place and in use. Where more than one trade is involved, the General Contractor shall be responsible for coordination and resolution of disputes between his subcontractors and material suppliers regarding responsibility for furnishing and installing individual parts, systems, materials, connections, proper separation, hardware, adapters, surface preparation, relationship conflicts, supports, blocking and all similar items required for the complete and fully functional weathertight installation of the work.

C. Related Contract Documents:

Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to, the following:

1. Existing site conditions and restrictions on use of the site.

2. Alterations and coordination with existing work.

3. Work to be performed concurrently by the Owner.

4. Work to be performed concurrently by separate contractors.

5. Work to be performed subsequent to work under this Contract.

6. Equipment / Material assigned as work of the Contract.

7. Requirements for partial Owner occupancy prior to substantial completion of the Contract Work.

8. Safety for and protection for occupancy, operation of existing facilities and construction to remain.

D. Summary by References:

Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary (Special Requirements) Conditions, Specification Sections, Drawings, addenda and modifications to the Contract Documents issued subsequent to the initial printing of the project manual and including, but not necessarily limited to, printed material referenced by any of these.

It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the Contract Documents.

E. The Owner may provide certain items of furniture, equipment, etc. Coordinate for utility rough-in and / or installation.

1.3 Contractor's Use of Premises:

A. General:
During the entire construction period the Contractor shall have the exclusive use of that portion of the phased contract work limits for construction operations, in accord with approved phasing plan schedule.

The Contractor shall limit his use of the premises to the work indicated, so as to allow for Owner occupancy and use by the public.

Use of the Site:
Confine operations at the site to the areas and limits permitted under the Contract and by law, ordinances, permits, and special conditions and special project procedures and coordination sections of the documents. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

1. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees at all times. Do not use these areas for parking or storage of materials.

2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site. Storage of material in the phased contract work limits shall be confined to noncombustible / non-hazard material that is scheduled for immediate use (no longer than 24-hour storage).

3. Lock mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place. Release hydraulic pressure when equipment is not in use. All vehicles delivering materials to the site shall be manned at all times, no exception.

B. Confine operations at site to areas and limits permitted by law, ordinances, permits, Contract Documents and SUPPLEMENTARY CONDITIONS.

C. Assume full responsibility for insurance, protection and safekeeping of products stored on premises.

D. Coordinate with the Owner and schedule deliveries and unloading to prevent traffic congestion blocking of access or interference with Work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.

E. Contractor to pay for, or satisfactorily repair, all damages incident to their Work, to sidewalks, streets, other public or private property, or to any public utilities occurring during period of work under Contract.

F. Owner furnished and installed items that may require coordination between this General Contractor and Owner assigned agent. Contractor should also verify requirements for utility rough-ins for Owner furnished equipment.

G. Contractor shall maintain all existing adjacent building exits passable for emergency pedestrian egress.

**H. Comply with Owner's Covid-19 safety measures, and requirements.**

1.4 Owner Occupancy / Partial Owner Occupancy:
The Owner reserves the right to place and install equipment as necessary in completed areas of the building and to occupy such completed areas prior to substantial completion, provided that such occupancy does not substantially interfere with completion of the work. Such placing of equipment and partial occupancy shall not constitute acceptance of the work or any part of the work.

1.5 Alterations and Coordination:

A. General:
The work of this contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from beginning of construction activity through project close-out and warranty periods.

B. Alterations:
Where applicable, requirements of the Contract Documents apply to alteration work in the same manner as to new construction.

C. General:
To expedite delivery and for other purposes in his own best interests, the Owner, before the date of the Contract, may negotiate purchase orders or make other commitments with supplies of material and equipment to be incorporated into the work by the Contractor. These purchase orders and commitments will be assigned to the Contractor for installation.

1.6 Miscellaneous Provisions (to include, but not be limited, by the following):

A. Provide all rough-in and utility connections for all Owner Furnished Equipment and all new plumbing fixtures, new kitchen equipment and for all new electrical fixtures, switches and outlets, etc.

B. Complete Plumbing, Heating, Ventilating, Air Conditioning, and Electrical systems.

C. Preparation of new finishes as called for in Finish Schedule and related specified Sections.

D. Rework and refinish those areas including ceiling tile and grid disturbed by work of Divisions 15 and 16, cutting and patching as required for these specifications. Strict coordination with the Architect and Owner's assigned project representative is mandatory.

E. Mechanical / Electrical Requirements of General Work:

1. General:

Except as otherwise indicated, comply with applicable requirements of Division 15 Sections for mechanical provisions within units of general (Division 2 - 14) Work. Except as otherwise indicated, comply with applicable requirements of Division 16 Sections for electrical provisions within units of general (Division 2 - 14) Work.

Service Connections: Refer to Division 15 and Division 16 Sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilization of available services.
Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.

2. Electrical Requirements:

Except as otherwise indicated, comply with applicable provisions of The National Electrical Code (NEC) and standards by National Electrical Manufacturer's Association (NEMA), for electrical components of general work. Provide Underwriters Laboratories listed and labeled products where applicable. See Division 16 and electrical drawings.

F. Performance Requirements for Completed Work

The Contract Documents indicate the intended occupancy and utilization of the building and its individual systems and facilities. Compliance with governing regulations is intended and required for the work and for the Owner's occupancy and utilization. In addition to the requirement that every element of the work comply with applicable requirements of the contract documents, it is also required that the work as a whole comply with the general building performance requirements.

1.7 Utilities for Construction:

Make all arrangements necessary to connect to all utilities required to accomplish work under this contract. The Contractor will be solely responsible for connection to utilities required for construction of this Contract.

A. The Owner shall pay for water and electricity usage bills required for normal construction purposes.

B. The Contractor shall provide reasonable heat, cooling and ventilation within the building as required until the mechanical system has been completed, connected and in operation in the normal sequence of construction. This is not "in addition" to any normal requirement for heating, cooling and ventilation under this Contract, but is to clarify that a subcontractor or a Separate Contractor may benefit from the existence of these systems.

C. Temporary Electrical Lighting and Power:

Until permanent electrical power is installed and until the building lighting fixtures are installed in the normal sequence of construction, the General Contractor will make available in each general area of the contract work, outlets to which the Separate Contractors may connect for temporary lighting and single phase electrical power. The General Contractor will pay all costs for this temporary utility extension and remove this temporary source when permanent electrical lighting and power outlets are installed. When, in the normal sequence of construction, the building lights are

installed and connected and the building electrical outlets installed, the use of these shall be available for use by the subcontractor and/or Separate Contractors at no cost to them. All temporary electrical lighting and power for Separate Contractors shall be single phase, except the General Contractor will provide sufficient three-phase service as required for the operation and testing of certain items of Equipment, such as food service equipment. Verify all electrical service and phasing prior to construction.

1.8 Requirements of Separate Contractors will be as follows:

A. Separate Contractors to enter the building site to accomplish his work at the approval of the building General Contractor shall cooperate and coordinate with the General Contractor and shall be subject to the General Contractor as to schedule and locations within the site for him to accomplish his work. The General Contractor is responsible for and is in charge of the building site.

B. The Separate Contractor is entitled to storage, access and work space inside the building in the same manner and subject to the same conditions and requirements as subcontractors for the building contract. The Separate Contractor will be advised of the availability of storage space (location coordinated by the General Contractor), and of responsibility to vacate and clean in time for final finish work.

C. Separate Contractors are liable for any damage to the building. The Separate Contractor shall immediately make good any stain, harm or damage to the building caused by his forces. Most particularly, his attention is directed to need for caution in not damaging ceiling tile and wall finishes. Before final payment will be made to a Separate Contractor, he must have settled with the building General Contractor for any damage done.

D. Separate Contractor must provide own toilet and telephone facilities (or make arrangements with the General Contractor as to pay rent for his share of cost).

E. Separate Contractor to make provisions for his own safety and to accomplish his work in compliance with all National and Local Safety Regulations.

F. Remove own trash and debris; each Separate Contractor to completely remove all trash and debris, caused by his work, from the building, and from the site.

G. Do not allow dust to be exhausted through mechanical system.

H. This Contractor to clean building exterior and interior as outlined in Section 01700-CLEAN UP.

1.9 Quality Control

A. Shop Drawings and Product Approval:
Compliance with Shop Drawing checking by the Contractor then submittal for approval to the Architect as required by GENERAL CONDITIONS and SUBMITTALS - SECTION 01350 .

B. Material Approval:
Compliance with SUBMITTALS - SECTION 01350 for submittal of products for approval by Architect before delivery of same to jobsite.

C. Qualifications of Workmen:

In acceptance or rejection of the work of the Sections specified herein, and in particularly that work involved with the application of finish materials, the Architect will make no allowance for lack of skill on the part of the workmen.

D. Special Inspections:
Compliance with special inspection requirements of the International Building Code is the responsibility of the General Contractor.

1.10 Patch and Repair Work:
Patch and Repair work under this Contract (in addition to work specified and indicated on the drawings) shall include, but not be limited to, the following:

Maintain fire integrity of walls, floors, ceilings and structure where piercing or openings are made. Use safing material as specified herein for approved UL poke-through applications.

1.11 N.I.C. Items:
Items noted as Not In Contract (N.I.C.) are to be furnished by Owner.

END OF SECTION

The Instructions to Bidders, General Conditions, Modified General Conditions and Special Project Requirements as set forth herein are applicable to the work under every Division and Section of these Specifications.

TIME FOR COMPLETION

All work under this Contract shall be complete and ready for Owner occupancy within Two Hundred Seventy (270) consecutive calendar days from written Notice To Proceed. The work under this contract shall commence within Ten (10) calendar days from date of Notice To Proceed.

TIME IS OF THE ESSENCE

The Owner must occupy the work within the completion time indicated herein. Delivery time for equipment and material provided under this contract shall include lead time for storage and ready installation within time limits of the work. Coordination of Owner furnished/Contractor installed equipment and/or materials shall be considered within time limits of the work.

BID GUARANTY

The base bid proposal shall be guaranteed for a period of Sixty (60) days after date of proposal. Alternate proposals (additive or deductive), if requested, shall be guaranteed for a period of Ninety (90) days after date of signing contract. Unit prices, if requested, shall be guaranteed until the date of final acceptance of the project by the Owner. Upon receipt of the drafted construction contract, the contractor shall have no more than fourteen (14) days to execute and return the construction contract to the architect with all supporting documentation in correct order.

INSURANCE

All projects require Builder's Risk Insurance

OWNER

All papers shall be delivered to the Owner, unless otherwise specified in writing to the Contractor. Wherever the term "Owner" is used in the Specification it shall refer to:

ST. CLAIR COUNTY BOARD OF EDUCATION
410 ROY DRIVE
ASHVILLE, AL 35953

ARCHITECT

Wherever the term "Architect" is used in the Specifications, it shall refer to:

LATHAN ASSOCIATES ARCHITECTS, P. C.
300 CHASE PARK SOUTH, SUITE 200
HOOVER, AL 35244

who by contract with the Owner, is authorized to prepare all drawings, details, and specifications for this work.

After the award of this contract, supervision of the work will be performed by the aforementioned Architect, his duly authorized representatives, or his duly appointed successor as may be designated in writing to the Contractor by the Owner.

APPLICABLE CODES AND AUTHORITIES

A. Codes

1. The work of this project shall be in accordance with the 2021 Edition, International Building Code. The minimum building standard code adopted by the Division of

Construction Management is the 2021 International Building Code. The following companion codes to the 2021 International Code are also adopted:

a. 2021 – International Existing Building Code.
b. 2021 – International Plumbing Code.
c. 2021 – International Fuel Gas Code.
d. 2021 – International Mechanical Code.
e. 2020 – National Electrical Code (NFPA 70).
f. 2021 – International Fire Code.
g. ANSI/ASHRAE/IES Standard 90.1 – 2013 Energy Standard for Buildings.
h. 2010 – ADA Standards for Accessible Design.
i. 2020 – ICC/NSSA-500 Standard for the Design and Construction of Storm Shelters.
j. 2019 NFPA 72: National Fire Alarm and Signaling Code (NFPA 72).

2. The requirements of the 2010 ADA Standards for Accessible Design supersede the accessibility requirements contained in the International Building Code and ANSI A117.1.

3. Promptly notify the Architect, in writing, if any of the contract documents are in conflict or variance with applicable codes, laws and ordinances. All changes will be made by written addenda or modifications.

B. Precedence of Codes

1. In case of conflict between the State Building Code, local codes, the Life Safety Code enforced by the State Fire Marshal, or other codes, the most stringent requirements shall prevail.

2. All food preparation facilities, private water systems, and sewage disposal systems shall also meet the requirements of and be approved by the applicable county health department.

C. Authorities, including but not limited to:

1. State of Alabama Department of Finance - Division of Construction Management (DCM)

2. Local Municipalities

3. Secure and pay for permits, impact fees, government fees and licenses. This will include, but not be limited to, all permits and/or fees required by ADEM, State of Alabama and the U.S. Army Corp of Engineers.

D. If any work is performed knowing it to be contrary to such codes, law, ordinances, rules and regulations and without notice to the Architect, the Contractor assumes full responsibility therefore and shall bear all costs for compliance thereto.

SAFE SPACE REQUIREMENTS

Reference: Act 2010-746 Safe Spaces in New K-12 Schools and Adoption of the ICC500 and 2020 ACC/NSSA Standard for the Design and Construction of Storm Shelters.

**Mandatory Contractor's Statement** – The Contractor's Statement of Responsibility provided under Additional Guidance on Safe Space Requirements, (form enclosed) must be completed by the contractor and submitted to the DCM Inspector prior to the start of construction. A copy of the Quality Assurance Plan must be attached to the Contractor's Statement.

**FIRE ALARM REQUIREMENTS**

The Certified Fire Alarm Act requires that every business who installs fire alarm systems in commercial occupancies must be licensed as a Certified Fire Alarm Contractor. The contractor must have a NICET Level III Technician in a position of responsibility, and the license will be issued in the name of the certificate holder and the contractor. The Certified Fire Alarm Act also requires that technicians working for the Certified Contractor must hold a current NICET Level II or equivalent certification. Contractors wishing to bid on fire alarm work must show evidence at the pre-bid conference that he/she meets the certification requirements of the Act and holds a permit issued by the State Fire Marshal.

Act 2009-657, effective August 1, 2012, requires fire alarm contractors to be permitted through the State of Alabama Fire Marshal's Office. In accordance with §34-33A-9, if a fire alarm contractor is going to do work in State of Alabama, the contractor must deliver to the local building official a copy of their State Fire Marshal's Fire Alarm Permit. In addition, the DCM requires the following:

> **For work involving fire alarm systems, General Contractors must provide a copy of the fire alarm contractor's State Fire Marshal's Fire Alarm Permit to the DCM Inspector at the pre-construction conference.**

NONRESIDENT BIDDERS

Nonresident bidders must accompany any written bid documents with a written opinion of an attorney at law licensed to practice law in such nonresident bidders' state of domicile, as to the preferences, if any or none, granted by the law of that state to its own business entities whose principal places of business are in that state in the letting of any or all public contracts.

PRE-BID CONFERENCE

A conference of intended bidders may be held by the Owner prior to the time for the opening of bids for the purpose of presenting and explaining the policies of the Board. Notification of date and place for conference shall be given by written addenda.

PRE-CONSTRUCTION CONFERENCE

A conference shall be held at the job site no later than two weeks following the date of "NOTICE TO PROCEED". The purpose of this conference is to define the duties and responsibilities of the Architect, Owner, Contractor and The State of Alabama Department of Finance - Division of Construction Management. All forms, procedures, schedules and other pertinent requirements will be discussed.

The pre-construction conference can be scheduled once the construction contract is fully-executed. Benchmarks must then be met for required inspections listed in the Pre-Construction Conference Checklist including periodic and special inspections when applicable, final inspections, and year-end inspections. $750K or Less projects with a contract awarded on or after 10/01/22 are exempt from Permit Fees. A copy of the check List is provided along with a Sample of the Pre-Construction Conference Agenda.

PRE-ROOFING CONFERENCE

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, DCM Inspector, General Contractor, Roofing Contractor, Sheet Metal Contractor, Roof Deck Manufacturer (if applicable), and the Roofing Materials Manufacturer. If equipment of substantial size is to be placed on the roof, the Mechanical Contractor must also attend this meeting.

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 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 Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty isn't provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.**

The following are to be accomplished during the conference:

1. Review all Factory Mutual and Underwriters 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 records and copies furnished to the General Contractor, the Owner, The State of Alabama Department of Finance - Division of Construction Management and the DCM Inspector.

**Regardless of whether or not the sample warranty has been submitted to the Architect, a copy of the warranty must be provided to the DCM Inspector by the Manufacturer at this Pre-Roofing Conference.**

PRE-FINISHES CONFERENCE

If elected by the Architect, a conference shall be held at the job site within two weeks prior to the installation of finishes. All Contractors involved with finish work are required to attend. The purpose of this conference is to discuss finish work, coordination issues, the Owner's and Architect's expectations of quality and workmanship and the position of the Owner and Architect regarding poor quality and workmanship. This conference must be scheduled two weeks in advance of any finish installation.

LIST OF SUBCONTRACTORS AND PRINCIPAL MATERIAL SUPPLIERS

A copy shall be prepared by the successful Contractor and delivered to Architect within **Twenty-Four (24) hours after bid**. List shall show following information on each Subcontractor and/or Supplier:

A. Name of Subcontractor and/or Supplier
B. Complete mailing address
C. Telephone Number
D. Person to contact and position in organization
E. Scope of Work to be performed by Subcontractor and percent of total contract.
F. For work involving fire alarm systems, General Contractor's must submit a copy of the Fire Alarm contractor's State Fire Marshall's Fire Alarm Permit at the same time as submission of the subcontractor and supplier list to Architect. The architect or engineer shall reject fire alarm contractors who cannot provide a copy of the required permit.

This list may also be emailed to submittals@lathanassociates.com.

PROGRESS SCHEDULES AND CHARTS

One hard copy prepared by Contractor and delivered to Architect at beginning of job. Five (5) additional copies must be submitted with each monthly request for payment showing actual progress. The schedule shall be in the form of an Analog Bar Chart Schedule of suitable scale to indicate appropriately the percentage of work scheduled for completion at any time. The Contractor shall enter on the Chart his actual progress, preferably at the end of each week, but in any event, at the end of each month, and deliver to the Architect five (5) copies thereof and attach one to his monthly Application for Partial Payment.

CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the "Schedule of Values".

2. Within each time bar indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicated graphically sequences necessary for completion of related portions of the work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

B. Work Stages

Indicate important stages of construction for each major portion of the work, including testing and installation.

C. Cost Correlation

At the head of the schedule, provide a two-item cost correlation line, indicating "precalculated" and "actual" costs. On the line show dollar-volume of work performed as of the dates used for preparation of payment requests.

D. Distribution

Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work

and are no longer involved in construction activities.

E. Schedule Updating and Progress Photographs
Revise the schedule after each bi-weekly meeting or activity, where revisions have been recognized or made. Issue the copies of updated schedule concurrently with progress photographs and report of each meeting to the Owner and Architect.

NOTICE OF SALES AND USE TAX EXEMPTION

The Owner is a tax-exempt agency. Materials incorporated into the Work are exempt from sales and use tax, therefore Contractor shall NOT include sales and use taxes in his Bid. Pursuant to Alabama Act No. 2013-205 (effective 5/9/2013), Contractors bidding the Work shall be required to attach "Accounting of Sales Tax" (DCM) Form C-3A-Sales Tax) to their Bid. **FAILURE OF THE CONTRACTOR TO COMPLETE THIS ATTACHMENT TO BID PROPOSAL FORM INDICATING THE SALES TAX AS REQUIRED BY ACT 2013-205, SECTION 1 (g) SHALL RENDER THE BID NON-RESPONSIVE.**

It shall be the responsibility of the successful Contractor and any Subcontractor working under the same contract to apply for a Certificate of Exemption from the Alabama Department of Revenue for this specific project and to comply with all ADOR rules and regulations. The Owner shall not consider claims for additional costs resultant of the Contractor's or its subcontractors' failure to comply with such rules and regulations.

However, the Owner may elect to issue Form ST: PAA1 Purchasing Agent Appointment which appoints the Contractor as Agent to purchase materials Tax-Exempt. In this case, invoices must be transmitted for direct payment by the Owner.

DAMAGE TO PROPERTY

A. The Contractor shall be solely responsible for all work of this contract prior to such work achieving official Substantial Completion as per ARTICLE 32 of the General Conditions of the Contract; and for providing adequate insurance, including: project specific Builder's Risk Insurance and Flood Insurance to cover the following:
   1. Any damage to or loss of stored materials.
   2. Any damage to or loss of in-place work.
   3. Any damage to or loss of any portion of on-site or off-site property, existing or new, resulting from failure of or omission of protective measures; or caused by the work of this contract, including but not limited to: property, furnishings, contents or loss of revenue.

   The Contractor shall be further responsible for promptly correcting or remedying of any such damage or loss; and shall exercise all reasonable measures to minimize any resulting delays to the projects original completion schedule.

B. Damaged work shall be considered Defective Work.

USER FEES - CONTRACTOR

The State of Alabama Department of Finance - Division of Construction Management has adopted a new rule, Administrative Rule 170X-8 Collection of User Fees. The full text of Administrative Rule 170X-8 is available on The State of Alabama Department of Finance - Division of Construction Management's website. It is the responsibility of the General Contractor to visit The State of Alabama Department of Finance - Division of Construction Management website to verify these rules.

PERMIT FEE

A permit fee will be required for projects exceeding $750,000. All projects will be inspected by The State of Alabama Department of Finance - Division of Construction Management. The permit fee is outlined in the Administrative Rule 170X-8.

DCM Form C-8, "General Conditions of the Construction Contract", Article 44, Para. A, states the following:

> "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 all 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."

For public works projects falling under The State of Alabama Department of Finance - Division of Construction Management's jurisdiction and bid after October 1, 2014, the Architect shall include a copy of The State of Alabama Department of Finance - Division of Construction Management user fee schedule in the project manual and specify that the permit fee is to be included in the contractor's bid and paid by the Contractor.

The Pre-Construction Conference cannot be held until both (1) the permit fee and (2) the signed construction contract has been received by The State of Alabama Department of Finance - Division of Construction Management.

| **PERMIT FEE SCHEDULE WORKSHEET** | |
|---|---|
| **Cost Categories** | **Permit Fee Calculation** |
| Less than $1000 | N/A |
| $1001 – $50,000 | Cost of the Work minus $1,000 = _____/1000 x $5.00 = _____ + $15.00 = Permit Fee Due |
| $50,001 – $100,000 | Cost of the Work minus $50,000 = _____/1000 x $4.00 = _____ + $260.00 = Permit Fee Due |
| $100,001 – $500,000 | Cost of the Work minus $100,000 = _____/1000 x $3.00 = _____ + $460.00 = Permit Fee Due |
| $500,001 and up | Cost of the Work minus $500,000 = _____/1000 x $2.00 = _____ + $1,660.00 = Permit Fee Due |

INSPECTIONS

**Scheduling** - The contractor will contact the architect by e-mail at inspections@lathanassociates.com of the date the project will be ready for an inspection.

- The Architect will contact The State of Alabama Department of Finance - Division of Construction Management (DCM) Inspector to schedule the first available date for the inspection. Inspections must be requested minimum 14 days in advance.

- When the DCM Inspector confirms the inspection time, the Architect will send an e-mail confirming the inspection time and date.

- Cancellations of any scheduled inspection must be received in writing by e-mail no less than 48 hours prior to the scheduled inspection. If an inspection is cancelled, it will be rescheduled subject to the DCM Inspector's availability.

- If an inspection is cancelled less than 48 hours prior to the scheduled inspection, the re-inspection fee of $1,500 will be charged to the General Contractor.

- If an inspection is held and the project is not deemed ready for inspection or it does not pass the inspection, a re-inspection fee of $1,500 will be charged to the General Contractor.

**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 Subcontractors, DCM Inspector

    - Inspection Requirements:
        - Signed construction contract
        - Verification of payment of permit fee
        - Contractor's Statement of Responsibility and Quality Assurance Plan (for storm shelter)
        - Fire Alarm Contractor's Certification (from State Fire Marshal)
        - ADEM permit, if more than 1 acre of land is disturbed

- Pre-Construction Conference for Storm Shelter
    - Required Attendees: Contractor, Owner, Architect, Structural Engineer, Major Subcontractors, Special Inspections Representative, DCM Inspector

    - Inspection Requirements:
        - DCM Inspector must have already received Contractor's Statement of Responsibility and Quality Assurance Plan

- Pre-Roofing Conference
    - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative, DCM Inspector

    - Inspection Requirements:
        - 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 roofing warranty

- Above-Ceiling Inspections
    - Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors DCM Inspector

    - Inspection Requirements:
        - All work must be completed except for install at ion of ceiling tiles and/or hard ceilings
        - Space must be conditioned
        - Permanent power must be connected unless otherwise arranged with the DCM Inspector
        - Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and Above-Ceiling Inspection

- Life Safety Inspections and Final Inspections
    - Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshal, DCM Inspector

    - Inspection Requirements:
        - Fire alarm certification
        - Provide Smoke Machine for testing of Duct Detectors
        - General Contractor's 5-Year Roofing Warranty (DCM Form C-9)
        - Roofing manufacturer's guaranty
        - Above ground and below ground sprinkler certifications
        - Completed Certificate of Structural Engineer 's Observations for storm shelters
        - Emergency and exit lighting tests
        - Fire alarm must be monitored
        - 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 DCM 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 Inspections
    - Required Attendees: Contractor, Owner, Architect, Engineers, DCM Inspector and /or Major subcontractors may also be required to attend

    - Inspection Requirements:
        - Owner 's list of documented warranty items

MATERIALS

ALL MATERIALS FOR THIS PROJECT SHALL BE ASBESTOS FREE.

PROTECTION OF WORK AND PROPERTY

Contractor shall confine his operations to the project work limits of this contract and shall maintain required exit and fire safety requirements as well as Owner's security requirements. Protect adjoining spaces and cause no damage to same; any damage to be immediately repaired.

A. Protection of Work and the Public

Provide adequate protection, in full accordance with local, State and Federal regulations, for the work in progress as well as for the public and others using the site, until the completion of all work.

Provide suitable signs, signals and barricades against trespassing by individual and take whatever steps necessary or required by law to protect workers and public from harm. Protect the work and the public from damage of any kind during all operations. Methods described herein are minimum standards acceptable except where exceeded by Federal, State or local requirements.

B. Safety and Traffic Control Devices During Construction

1. Within the limits of area designated for work under this contract, and any staging or traffic areas, this Contractor shall furnish, install and maintain all safety and traffic control devices during the construction period as described herein, and as required by law.

2. All safety and traffic control devices shall be in compliance with Federal, State and local laws and regulations, and to the requirements and approval of applicable local officials, State Highway Department and the Architect.

3. Wherever the work affects the normal flow of vehicular or pedestrian traffic, traffic control devices shall be in accordance with requirements and standards as set forth in the "Manual on the Uniform Traffic Control Devices for Streets and Highways", latest edition, as published by U.S. Department of Transportation, Federal Highway Administration, and Section "G" of the Alabama Manual on Uniform Traffic Control Devices, Volumes I and II, latest edition.

4. Traffic Control Devices. Traffic control devices shall be installed at the inception of the construction operations and shall be properly maintained during the periods of construction. They shall remain in place only as long as they are needed and shall be removed immediately thereafter.

5. All traffic control devices must be approved by the City, County and by all affected enforcing agencies.

6. Protective Construction Site Barricade

   a. Requirements: Contractor shall furnish, install and maintain throughout the life of the Contract, all necessary barricades, covers, scaffold guards, warning signs, warning lights, channelization markers and other protective devices, all as required by Owner, local rules, regulations and ordinances, and as necessary to protect the work from trespassing.

   b. Barricades, enclosing devices and warning lights may be standard rental items of equipment in compliance with these requirements; and shall be of a type that affords security, is quite visible and is easily moved.

   c. Materials for use in construction of site barricades and other protective devices shall be of new exterior plywood and not less than #2 pine structural lumber, all of good appearance, sound, square, straight, in line, braced and well-constructed. All materials, except those to be walked on, shall be painted.

   d. Move barricades from one area to the next as the work progresses. Remove all upon completion.

   e. Lighting on Barricades: Furnish and install traffic warning lights or barricades, in areas of vehicular traffic. Install yellow traffic signal lamps complete with all wiring, switches, disconnects, fusing, sockets, guards and hanging provisions. These lights shall be turned on during all hours of darkness (dusk to dawn). Maintain in service during the construction period; move forward as site of work moves. Remove all upon completion of work.

   f. See also erosion control requirements of Earthwork Section 02300.

   g. **Unauthorized visitors not permitted within working and storage areas.** OSHA approved suitable personal safety devices are to be provided for authorized visitors within working areas. Suitable fire extinguishing equipment, readily accessible from any part of the work, to be provided and maintained. Erect any and all required additional protective barriers, lights, etc., as necessary for safety and protection. Keep area of work closed off when not in use.

C. Utilities

1. See Section 01025 for Utility usage billing.

2. Other utility bills caused by work of the contract are to be paid by Contractor as outlined in the SUMMARY OF THE WORK. Contractor to provide own telephone, temporary heat and pay costs for same. Contractor to pay for any sewer impact fee as related to this project. All project related sanitary conditions are the responsibility of the Contractor.

3. Contractor must investigate and verify the existence and location of all site utilities in the field before starting work. Flag on site all underground service lines in the construction area. Notify the Architect of any condition which, in the Contractor's opinion, may interfere with the completion of work as designated. Excavating in the vicinity of existing utilities shall be done carefully and by hand. Maintain and protect existing utilities.

4. The Contractor is responsible for all temporary utility connections to utilities.

D. Protection of Materials
Properly and effectively protect all materials and equipment, before, during and after their installation. Contractor will be allowed to store materials, equipment, etc., on the site. Security of the area(s) will be the sole responsibility of the Contractor. **Protect materials such as insulation and insulated duct from rain exposure.**

E. Watchman
The Contractor, at his own expense and option, may employ a watchman at such time as he deems necessary to protect his work and/or materials.

DAMAGE TO PROPERTY
The contractor will be responsible for, and insure against, any damage to property, furnishings, and/or loss of revenue resulting from any damage to any part of the existing property caused by the work of this Contract.

SPECIAL SAFETY REQUIREMENTS
All exitways shall be maintained free and clear of all stored materials, debris, etc.

No combustible construction materials shall be stored in the Project area after the day's work is complete. Remove any potentially hazardous materials immediately to prevent any fire hazards which may result from the construction of this Project. In addition, precautions shall be made by the General Contractor to prevent any other activities at the site which may constitute a fire hazard.

In addition to any portable fire extinguishers existing in the building, the General Contractor shall provide additional fire extinguishers during the construction as required.

Refer to the General Conditions for additional safety requirements.

USE OF PREMISES, SANITARY PROVISIONS
Refer to SECTION 01035, SPECIAL PROJECT PROCEDURES, for use of premises, sanitary provisions which are specifically related to this project. Note that sanitary conditions are the responsibility of the Contractor.

All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security or evacuation requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

USE OF OCCUPIED PREMISES
During execution of this Contract, clear passages must be maintained as described along corridors. Owner

will endeavor to keep personnel and visitors from work areas, but it will be the Contractor's responsibility to enforce all safety precautions.

CUTTING AND PATCHING

All excavation and cutting of new work to accomplish the work shall be by the respective trades. It is to be noted that Divisions 15 and 16 each are required to perform the necessary cutting of floors, walls, ceilings as necessary to install the work of their trade, all under the direct supervision of the General Contractor and in accordance with the construction schedule. The General Contractor is responsible for the repair, replacement and finish of pavement, roofs, floors, walls and ceiling (all finish work); and same shall be accomplished by competent workmen and finish up in a neat manner, by craftsmen skilled in their work, all to be equal in quality and appearance of adjacent work. Finished installation shall comply with specified tolerances and finishes. The Contractor shall not cut, excavate, or otherwise alter any work in a manner or by a method or methods that will endanger the work, adjacent property, workmen, the public or the work of any other Contractor.

In acceptance or rejection of the work of the Sections involved in the application of finish materials, the Architect will make no allowance for lack of skill on the part of the workmen.

When necessary to cut, or alter completed work to accommodate subsequent work, the Contractor performing the work previously in place shall do such cutting and repairing.

Cost of cutting and repairs necessitated by fault of negligence, or for other reasons, shall be borne by the Contractor at fault in requiring such work.

If a Contractor or Subcontractor fails to do necessary cutting or fails to have restored any work of others damaged by him, for a period of time causing delay in project construction, the Owner may do so and cost thereof shall be charged to the General Contractor.

Cutting of structural members will not be permitted.

FIRE INTEGRITY OF CONSTRUCTION shall be maintained whenever components of rated assemblies are penetrated, jointed, cracked or compromised in any way either intentionally or unintentionally; including, but not limited to: walls, floors, ceilings and caps. Rated walls shall extend and key to floor, cap assembly or roof deck above using consistent materials.

Openings for "poke-through" pipe, conduit, etc., penetrations shall be of minimum size in accordance with UL published requirements for maintaining integrity of rated construction and fire sealed properly. Mortar or concrete in contact with copper will not be accepted. Expansive spray foam fill which is combustible shall not be allowed.

Opening shall be sealed full thickness of penetration, (i.e., grout solid up to within one (1) inch of finish surface then seal with rated sealant material). Any and all pipe and conduit penetrations of a finished wall, floor or ceiling materials shall be finished out with an approved escutcheon plate. Any penetration of rated walls or ceilings by mechanical ductwork shall be protected by use of rated fire damper system at point of penetration. Provide for collars as required at point of penetration through rated construction. Contractor shall provide fire integrity sign on rated wall construction (above ceiling) lines in accordance with the building code, and as outlined in PAINTING - SECTION 09910.

If specified under FIRESTOP CAULKING AND SEALING - SECTION 07840, fire caulking and sealing shall be **single source** provided using same approved materials and certified technicians throughout the project. All applicable trades shall coordinate accordingly and make their work ready to properly receive fire sealant. If fire sealing is not specified under a separate section, then all applicable trades shall fire seal their own work using the same mutually agreed upon fire sealing materials consistently throughout the project installed by manufacturer's certified technician(s). Acceptable fire sealing materials include, but are not limited to: Dow-Corning, 3-M Brand, Tremco meeting ASTM 3-119, ASTM 3-814 and mineral wool fiber safing.

USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER

A. Contractor agrees to permit Owner to use and occupy portions of building or Project before formal acceptance by Owner, provided that Owner:

1. Secures written consent of Contractor (except in event that in the opinion of Architect, Contractor is chargeable with unwarranted delay in final completion of contract requirements).

2. Secures endorsement from insurance carrier and consent of the surety, permitting occupancy and use of portions of project during remaining period of construction.

B. Use and occupancy prior to formal acceptance shall not relieve Contractor of his responsibility to maintain insurance coverage, as called for in specifications, for benefit of Owner, Owner's Agent, Contractor and all Subcontractors until Project is completed and accepted by Owner. However, use and occupancy of any area by the Owner prior to project completion shall mean partial acceptance of that area and any equipment within that area used by the Owner, thereby requiring a substantial completion agreement between the Owner and the Contractor for said area and equipment.

PROJECT SIGN

A. The General Contractor will erect a sign at the project site identifying the project. Wording for sign to be provided by the Owner through the Architect. Sign to be constructed of 3/4" x 4' x 8' exterior grade plywood with treated wood trim surround, mounted on two (2) 4" x 4" x 8'-0" treated wood posts, bottom of sign to be 3'-0" above finish grade. Sign painted with two coats best exterior grade alkyd paint before letters and graphics are painted on. 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 the unpainted exterior grade plywood.

B. Sign shall be single sided.

C. Location of sign to be coordinated with Architect and Owner and placed in a prominent location easily readable from existing street or roadway. Sign to be maintained in good condition until completion of Project. No other signs will be allowed on Project Site without the written approval of the Owner, issued through the Architect.

D. See DCM Form C-15 for PSCA Projects.

END OF SECTION

1.0 Requirements

As set forth herein are applicable to the Work under every Section or Division of this Specification, of the General Contractor and all Subcontractors.

1.1 Completion Date

Work under this contract shall be sufficiently completed to permit Owner to occupy the building, or a designated portion thereof, on or before date stipulated on the Proposal Form and accepted by Owner. See Paragraph entitled Time For Completion under SPECIAL PROJECT REQUIREMENTS, SECTION 01030.

1.2 Acceptance of Preceding Work

Before starting any operation, Contractor and each Subcontractor shall examine existing work performed by others to which his work adjoins. Failure to remedy faults in or notify Architect of deficiencies or faults in preceding work will constitute acceptance thereof and waiver of any claim of its unsuitability.

1.3 Layouts and Levels

General Contractor shall establish principal lines, grades, levels and corners, and shall set and maintain adequate reference points therefore. Contractor shall lay out own work to dimension from principal lines and shall be responsible for layout of his subcontractor's work.

1.4 Product Approval

A. In addition to items submitted for approval by Shop Drawings, Contractor to submit for approval within ten (10) days after receipt of Notice to Proceed a list of all products proposed for use in the work, listing manufacturer, make, model number, catalog listing subcontractors' and / or vendors' names, and other manufacturers' identification for each particular product for each particular use. Submit in letter form in 3 copies, and approval obtained before material is ordered. Submit list of products requiring color selection. Approved list of products manufacturer and / or vendor will be returned promptly in order to avoid any delay of ordering materials specified. General Contractor shall review with Architect and the Owner the actual status of availability of all materials and schedule of work in the building, (including Alternates).

B. Submit complete Product Data and testing results, if requested.

1.5 Weather Protection

Contractor provide, maintain and pay all cost for all weather protection required to properly protect all parts of structure from damage during construction. Note that building heating and cooling system will remain in operation throughout the contract period.

1.6 Manufacturer's Directions

A. Apply, install, connect and erect manufactured items or materials according to recommendations of manufacturer when such recommendations are not in conflict with Contract Documents.

B. Furnish to Architect, on request, copies of manufacturer's recommendations. Secure approval of recommendations before proceeding with work.
**ALL MANUFACTURED ITEMS THAT ARE STRUCTURAL IN NATURE SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ALABAMA AND SUBMITTED FOR APPROVAL.**

1.7 Coordination Between Trades: Contractor's Pre-Construction Coordination Meeting

A. Plumbing, Heating, Ventilating, Air Conditioning and Electrical Drawings are diagrammatic.

B. BEFORE COMMENCING WORK UNDER THIS CONTRACT, GENERAL CONTRACTOR

IS TO ARRANGE FOR A MEETING OF ALL MAJOR SUBCONTRACTORS (AND SEPARATE CONTRACTS AS APPLICABLE) TO DETERMINE THAT ALL ITEMS WILL FIT INTO SPACES PROVIDED, HEADROOMS MAINTAINED, CONCEALMENT REQUIRED, WALL THICKNESS SUFFICIENT FOR RECESS OF ITEMS, PRIORITIES ESTABLISHED IN INSTALLATION OF DUCTS, PIPING, ETC. **EACH SUBCONTRACTOR MUST HAVE THEIR RESPECTIVE ON-SITE JOB FOREMAN PRESENT.** Each Subcontractor to have drawings of all trades, and to be completely aware of and fully informed of, requirements and locations of work to be installed by other Subcontractors. In case of disagreements in locations, General Contractor is to settle same, giving preference to ductwork and larger items, except where grading of pipe may require preference. All decisions to be recorded on each Subcontractor's drawings and on jobsite set of drawings and fully inform all Subcontractors. No changes to be made which affect finish locations or alter requirements of contract without approval of the Architect. Do not cover or block previously installed alarm devices, valves, etc., without providing for access to same.

C. If, in any location, it is impossible to install required items and maintain requirements as to ceiling heights, clearances dimensions, etc., or due to structural interference, General Contractor is to advise Architect for a decision.

1.8 City Ordinances

A. Comply with all City rules, regulations and ordinances in regard to parking, unloading, blocking of street, sidewalk or alley; and provide all lights, barriers, temporary walkways, protection, etc., as necessary for complete compliance.

B. Comply with applicable Code and all local and Federal laws and ordinances in regard to safeguards during construction and fire protection, and all governing regulations pertaining to requirements during construction.

1.9 Operating and Maintenance Instructions

A. Contractor shall instruct Owner's operating personnel in proper operation, lubrication and maintenance of all equipment items installed under this contract.

B. At completion of job, Contractor shall provide three (3) copies of a brochure containing manufacturer's operating, lubricating and maintenance instructions and parts lists for each item of equipment furnished under this contract. Each copy shall be assembled and bound under a substantial hardboard cover with title and index. Provide a complete set of approved manufacturer's and contractor's shop and equipment "setting" drawings for major systems and equipment furnished under this contract.

One (1) copy of the Operating and Maintenance instructions shall be hand delivered to the Architect at the final inspection and the remaining copies shall be provided to the Owner prior to issuance of the Certificate of Substantial Completion

1.10 Site Limitation and Use

A. General Contractor and each Subcontractor shall note the extent of site available for access and storage. Contractor restricted to those limits.

B. All personnel required on the job site must at all times be in possession of **state issued** photo identification subject to examination by Owner or their representative. Other security requirements may also be in place and is the responsibility of the General Contractor to abide by all school rules.

C. Contractor and Subcontractors are further cautioned that the traffic on adjacent streets may place strict limitations on the rates and means of delivery of materials, equipment and supplies, the removal of rubbish, and, in some cases, the hours during which deliveries are made.

1.11 Protection of Existing Property Adjacent

A. Protect and cause no damage to adjacent area and site.
During progress of work, Contractor will be responsible for full and complete protection of property which the work is being done, insofar as related to work under this Contract. Any damage to adjacent property, or contents caused by failure in performance with these requirements must be made good by Contractor at his own expense and to the satisfaction of Owner. Any damage to existing adjacent areas outside contract work limits shall be replaced with exact same materials as that damaged.

B. Provide for means to prevent objectionable dust and debris blowing onto adjacent property or streets from work being accomplished under this contract.

1.12 Dimensions

Contractor and each Subcontractor shall verify dimensions at site for built-in work, for work adjoining that of other trades and for dimensions shown to existing structures or installations. Notify Architect of any discrepancies.

1.13 Security of Construction Area

Contractor shall secure on site storage of materials and equipment. Storage of materials shall be within the Contractor's limit of construction at the site. This General Contractor shall adhere to Owner's requirements for security of work area and under all conditions shall be subject to these security regulations and requirements. Off-site storage of materials and equipment that are to be installed in the project shall be in a bonded storage area as outlined in the General Conditions.

1.14 Delivering and Storage

A. Deliver packaged materials to site in manufacturer's original, unopened and labeled containers. Do not open containers until approximate time for use.

B. Store materials in a manner that will prevent damage to materials or structure, and that will prevent injury to persons. No materials will be stored outside of contract work area by this Contractor.

C. Store cementitious materials in dry, weathertight, ventilated spaces. Store ferrous materials to prevent contact with ground and to avoid rusting and damage from weather.

1.15 Fire Protection

Contractor to take all necessary steps to ensure prevention of fire. Contractor to have portable extinguishers on hand at site throughout the period of construction. Flammable and combustible materials shall be kept in metal cans with tight covers and removed from building at end of each working day.

Fire protection systems within existing buildings must be maintained in full operation during construction.

1.16 Hoist, Ramps, Elevator Access, etc.

Furnish and Maintain as Necessary: Hoists, ramps, railings, platforms, etc., required in conformance with local applicable regulations. Hoists shall be operated by qualified and experienced mechanics. Space for hoist shall be coordinated with Architect and Owner's assigned project representative.

1.17 Chases and Openings

Provide all proper chases, openings and recesses as indicated for work under this Contract. Build in all sleeves, anchors, etc., for proper engagement of work to be installed. All post piercing of slabs and masonry shall be core drilling.

END OF SECTION

## 1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary Conditions (plus modifications thereto), and other Division 1 Specification sections, apply to work of this section.

1.2 Description of Work

Minimum administrative and supervisory requirements necessary for coordination of work on the project include, but are not necessarily limited to, the following:

A. Coordination and meetings.
B. Administrative and supervisory personnel.
C. Surveys and records or reports.
D. Limitations for use of site.
E. Special reports.
F. General installation provisions.
G. Cleaning and protection.
H. Conservation and salvage.
I. Special Inspections.

1.3 Coordination and Meetings

A. General

Prepare a written memorandum on required coordination activities. Include such items as required notices, reports and attendance at meetings. Distribute this memorandum to each entity performing work at the project site. Prepare similar memorandum for separate contractors where interfacing of their work is required.

B. Coordination Drawings

Prepare coordination drawings where work by separate entities requires fabrication off-site of products and materials which must accurately interface. Coordination drawings shall indicate how work shown by separate shop drawings will interface and shall indicate sequence for installation.

C. Bi-Weekly Coordination Meetings

Hold bi-weekly general project coordination meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Request representation at each meeting by every party currently involved in coordination or planning for the work of the entire project. Conduct meetings in a manner which will resolve coordination problems. Record results of the meeting and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. At Contractor's option, bi-weekly coordination meetings can be held integrally with progress meetings.

1.4 Administrative / Supervisory Personnel

A. General

In addition to a General Superintendent and other administrative and supervisory personnel required for performance of the work, provide specific coordinating personnel as specified herein.

B. Project Coordinator

Provide a full-time Project Coordinator experienced in administration and supervision of building construction, including mechanical and electrical work. This Project Coordinator is hereby authorized to act as general coordinator of interfaces between units of work. For the purpose of this provision, "interface" is defined to include scheduling and sequencing of work, sharing of access to work spaces, installation, protection of each other's work, cutting and patching, tolerances, cleaning, selections for compatibility, preparation of coordination drawings, inspections, tests, temporary facilities and services, scheduling and sequencing of mechanical / electrical work, integration of work placed into limited spaces available for mechanical / electrical installations, each trades' protection of work by other trades and preparation of mechanical / electrical coordination drawings.

1.5 Surveys and Records / Reports

A. General

Establish markers to set lines and levels for work as needed to properly locate each element of the project. Calculate and measure required dimensions as shown within recognized tolerances. Drawings shall not be scaled to determine dimensions. Advise entities performing work of marked lines and levels provided for their use.

B. Survey Procedures

Before proceeding with the layout of actual work, verify the layout information shown on the drawings, in relation to the existing partitions and conditions. As work proceeds, check every major element for line, level and plumb. Maintain a record of such checks; make this record available for the Architect or Engineer. Record deviations from required lines and levels and advise the Architect or Engineer promptly upon detection of deviations that exceed indicated or recognized tolerances. Record deviations which are accepted, and not corrected, on record drawings.

1.6 Limitations on Use of the Site

A. General

Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements administer allocation of available space equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

B. See also specific requirements of SECTION 01030 - SPECIAL PROJECT REQUIREMENTS and SECTION 01035 SPECIAL PROJECT PROCEDURES.

1.7 Special Reports

A. General

Submit special reports directly to the Owner through the Architect within one day of an occurrence. Submit a copy of the report to the other entities that are affected by the occurrence.

B. Reporting Unusual Events

When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List chain of events, persons participating, response by the Contractor's personnel, and evaluation of the results or affects and similar pertinent information. Advise the Owner in advance when such events are known or predictable.

C. Reporting Accidents

Prepare and submit reports of significant accidents at the site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

## 2.0 -PRODUCTS

Not applicable.

## 3.0 - EXECUTION

### 3.1 General Installation Provisions

A. Pre-Installation Conferences

Hold a pre-installation meeting at the project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in, or affected by, that unit of work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. Advise the Architect / Engineer of scheduled meeting dates.

1. At each meeting review progress of other work and preparations for the particular work under consideration including specific requirements for the following:

   Contract documents.
   Options.
   Related change orders.
   Purchases.
   Deliveries.
   Shop drawings, product data and quality control samples.
   Possible conflicts and compatibility problems.
   Time schedules.
   Manufacturer's recommendations.
   Compatibility of materials.
   Acceptability of substrates.
   Temporary facilities.
   Space and access limitations.
   Governing regulations.
   Safety.
   Inspection and testing requirements.
   Required performance results.
   Recording requirements.
   Protection.

2. Record significant discussions of each conference, and record agreements and disagreements, along with the final plan of action. Distribute the record of meeting promptly to everyone concerned, including the Owner and Architect / Engineer.

3. Do not proceed with the work if the pre-installation conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene pre-installation conference at the earliest feasible date.

B. Installer's Inspection of Conditions
Require the Installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The Installer shall report all unsatisfactory conditions in writing to the Contractor. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

C. Special Inspections
Coordinate and schedule for Special Masonry Inspections with Masonry Contractor and Owner's Inspector as required to comply with current Building Codes. All grout placement for CMU walls shall be witnessed by the Special Inspector.

D. Manufacturer's Instructions
Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than the requirements indicated in the contract documents.

E. Inspect each item of materials or equipment immediately prior to installation. Reject damaged and defective items.

F. Provide attachment and connection devices and methods for securing work. Secure work true to line and level and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable visual-effect choices to the Architect / Engineer for final decision.

G. Recheck measurements and dimensions of the work as an integral step of starting each installation.

H. Install each unit-of-work during weather conditions and project status which will ensure the best possible results in coordination with the entire work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.

I. Coordinate enclosure of the work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.

J. Mounting Heights
Where mounting heights are not indicated, mount individual units of work at industry recognized standard and A.D.A. acceptable mounting heights for the particular application indicated. Refer questionable mounting height choices to the Architect / Engineer for final decision. For mounting heights on Owner Furnished Equipment, Contractor shall obtain accurate information from data supplied by Owner or from field measurements of actual equipment to be relocated and installed.

3.2 Cleaning and Protection

A. General
During handling and installation of work at the project site, clean and protect work in progress and adjoining work on the basis of continuous maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion.

B. Clean and perform maintenance on installed work as frequently as necessary

through the remainder of the construction period. Adjust and lubricate operable components to ensure proper operation without damaging effects.

C. Limiting Exposures of Work

To the extent possible through reasonable control and protection methods, supervise performance of the work in such a manner and by such means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period. Such exposures include, where applicable, but not by way of limitation, to the following:

Excessively high or low temperatures.
Thermal shock.
Excessively high or low humidity.
Water or ice.
Solvents.
Chemicals.
Electrical current.
Incompatible interface.
Misalignment.
Unprotected storage.
Theft.
Vandalism.

3.3 Conservation and Salvage

It is a requirement for supervision and administration of the work that construction operations be carried out with the maximum possible consideration given to conservation of energy, water and materials.

END OF SECTION

## 1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and General Provisions of Contract, including General and Supplementary Conditions (plus modifications thereto), and other Division 1 Specification Sections, apply to work of this Section.

1.2 Description of Requirements

A. Definition

"Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

1. "Cutting and patching" is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

2. Cutting and patching performed during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

B. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

Unless otherwise specified, requirements of this section apply to mechanical and electrical work. Refer to Division 15 and Division 16 Sections for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.3 Quality Assurance

A. Requirements for Structural Work

Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

B. Before cutting and patching the following categories of work, obtain the Architect / Engineer's approval to proceed with cutting and patching as described in the procedural proposal for cutting and patching.

1. Structural steel.
2. Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories or work.
3. Structural concrete.
4. Bearing walls.
5. Structural decking.
6. Exterior wall construction.
7. Piping, ductwork, vessels and equipment.
8. Structural systems of special construction, as specified by Division 13 Sections.

**C. Where new work is indicated to interface with an existing roofing system or other systems potentially under current warranty, the Contractor shall coordinate as required to verify and provide new work in such manner and with such resources as to maintain the Owners current warranty accordingly without compromise.**

D. Operational and Safety Limitations
Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

E. Before cutting and patching the following elements of work, and similar work elements where directed, obtain the Owner's approval through the Architect / Engineer to proceed with cutting and patching as proposed in the proposal for cutting and patching. Note fourteen (14) day prior notice requirement of Owner.

1. Primary operational systems and equipment.

2. Noise and vibration control elements and systems.

3. Control, communication, conveying and electrical wiring systems.

F. Visual Requirements
Do not cut and patch work exposed on the building's exterior or in its occupied spaces in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Architect to be cut and patched in a visually unsatisfactory manner.

1.4 Submittals

A. Procedural Proposal for Cutting and Patching
Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:

1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.

2. List products to be used and firms that will perform work.

3. Give dates when work is expected to be performed.

4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted. Request day and time desired for disruption of services.

5. Where cutting and patching structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.

6. Approval by the Architect / Engineer to proceed with cutting and patching work does not waive the Architect / Engineer's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

2.0 - PRODUCTS

2.1 Materials

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

## 3.0 - EXECUTION

3.1 Inspection

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

B. Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.2 Preparation

A. Temporary Support

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

B. Protection

1. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

C. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

3.3 Performance

A. General

Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect / Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.

B. Cutting

1. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.

2. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering, and chopping. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion

of pipe and conduit to prevent entrance of moisture or other foreign matter.

C. Patching

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

2. Where feasible, inspect and test patched areas to demonstrate integrity of work.

3. Restore exposed finishes of patched areas and, where necessary, extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

4. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.

5. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.

6. Patch and repair existing plaster / gypsum board ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 Cleaning

Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

## 1.0 GENERAL REQUIREMENTS

Temporary facilities and controls required for this project include, but are not necessarily limited to, the following:

### 1.1 Temporary Structures

A. Provide and maintain field office separate from the project of not less than 300 sq. ft. in area equipped with the following:

1. Heater or air conditioner as required by weather.
2. Telephone service.
3. Computer with ability and service to send/receive email.
4. Printer
5. Adequate lighting.
6. Plan table, 36" x 60" minimum (2)
7. Plan rack.
8. Desk and chair with lockable file drawer in desk.
9. Toilet facilities: Provide 1 water closet and 1 lavatory.
10. Computer system capable of sending/receiving emails with printer.

B. Within the Contractor's facilities, provide enclosed space adequate for holding weekly project meetings. Furnish with all required tables, chairs and utilities.

C. The entire facility, including furniture, will remain the property of the Contractor and shall be maintained at the site until 100% completion of the Work.

D. Portable office or trailer meeting above requirements acceptable pending local approval.

### 1.2 Temporary Facilities

A. Temporary water and electrical service connections will be provided by General Contractor. This Contractor shall make necessary connections and provide conductors and furnish and install area distribution boxes so located that the individual trades may use 30m (100') maximum length extension cords to obtain adequate power and artificial lighting at all points where required for the Work, and for inspection and safety.

B. Cost of temporary water and electric connections and conductors shall be borne by Contractor.

C. Provide temporary toilets in portable units. Toilets must meet standards of the County Public Health Department. Toilets shall be maintained for the duration of the project.

D. Remove temporary utilities on completion of construction.

### 1.3 Temporary Scaffolds, Lifts, Staging and Stairs

Provide scaffolds, lifts, staging, stairs, ramps, ladders, runways, platforms, hoists and guard rails necessary for execution of construction. Comply with recognized safety rules and prevailing laws or ordinances. Remove on completion of construction.

### 1.4 Protective Barricades and Temporary Walkways

A. Contractor to provide and maintain all necessary temporary barricades, covers, enclosing fences, walkways, scaffolds, guards, street barricades, etc., in accordance with requirements of SPECIAL PROJECT REQUIREMENTS - SECTION 01030.

Height and location to be in compliance with local codes and ordinances. Provide adequate warning signs and warning lights.

B. Materials for construction shall be substantial, sound, all of good appearance, straight, in line, unyielding, complete, well installed, braced and adequate for use intended. All to comply with requirements of local codes and ordinances including the International Building Code. Provide and install gates and doors in enclosing barricade as required.

C. Remove upon completion of the work.

1.5 Construction Fence

A. Provide 6'-0" high chain link fence around area of work, around staging area, and/or material storage area(s) as directed and/or as deemed necessary for safety. Fence shall be supported on steel posts and be free standing with panel stands. Fence to be maintained in good condition throughout contract period. Remove fence when contract is completed and repair any site damage caused by fence and posts.

B. Fence adjacent to pedestrian and traffic areas as required to safely maintain ongoing school operations subject to the Site Limits and approval of the Owner and the Architect.

C. Provide lockable gates (truck gates and pedestrian gate as required). Locate at Contractor's option. Keep gates closed except during actual ingress and egress.

D. Route fence in behind existing fire hydrants to keep available from street side at all times.

E. Coordinate fence location with Owner prior to installation of fencing and gates. Fencing and gates shall not obstruct the Owner's daily operation of pedestrian, bus, and or car traffic.

1.6 Protection

Conform to requirements of "Safety & Protection of Persons and Property", in GENERAL CONDITIONS.

1.7 Maintaining Traffic

A. Do not close or obstruct streets, sidewalks, alleys and passageways without permit. Do not place or store material in streets, alleys or passageways.

B. Conduct operations with minimum interference to roads, streets, driveways, alleys, sidewalks and facilities, except as noted herein.

C. Provide, erect and maintain lights, barriers and the like required by traffic regulations or local laws.

1.8 Protection of Structure and Property

A. Execute work to ensure adjacent property against damages which might occur from falling debris or other cause; do not interfere with use of adjacent property. Maintain free, safe passage to and from same.

B. Take precautions to guard against movement, settlement or collapse of any sidewalks or street passages adjoining property; be liable for any such movement, settlement or collapse; repair promptly such damage when so ordered.

1.9 Project Signs

Allow no signs or advertising of any kind on the job site except as specifically approved in advance by the Architect.

1.10 Maintenance and Removal

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

END OF SECTION

## 1.0 - GENERAL REQUIREMENTS

1.1 Related Documents

Drawings and general provisions of Contract, including General and Supplementary (Special) Conditions, and modifications thereto, and other Division 1 Specifications Sections, apply to work of this Section. See Special Project Requirements Section 01030 for pre-installation meetings and pre-finishes meeting.

1.2 Description of Requirements

A. General

Required inspection and testing services are intended to assist in the determination of probable compliance of the work with requirements specified or indicated. These required services do not relieve the Contractor of responsibility for compliance with these requirements or for compliance with requirements of the Contract Documents.

B. Definitions

The requirements of this section relate primarily to customized fabrication and installation procedures, not to the production of standard products. Quality control services include inspections and tests and related actions including reports performed by independent agencies and governing authorities, as well as directly by the Contractor. These services do not include Contract enforcement activities performed directly by the Architect or Engineer.

1. Specific quality control requirements for individual units of work are specified in the sections of these specifications that specify the individual element of the work. These requirements, including inspections and tests, cover both production of standard products and fabrication of customized work. These requirements also cover quality control of the installation procedures.

2. Inspection, tests and related actions specified in this section and elsewhere in the Contract Documents are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the Contract Documents.

3. Requirements for the Contractor to provide quality control services as required by the Architect / Engineer, the Owner, governing authorities or other authorized entities are not limited by the provisions of this section.

1.3 Responsibilities

A. Testing

Owner shall employ and pay for testing services except where tests are specifically indicated as being the contractor's responsibility.

B. Re-Test Responsibilities

Where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance or related work with the requirements of the Contract Documents, then re-tests are the responsibility of the Contractor, regardless of whether the original test was the Contractor's responsibility. Re-testing of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original work.

C. Responsibility for Associated Services

The Contractor is required to cooperate with the independent agencies performing required inspections, tests and similar services. Provide such auxiliary services as are reasonably requested. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel. These auxiliary services include, but are not necessarily limited to, the following:

1. Providing access to the work.
2. Taking samples or assistance with taking samples.
3. Delivery of samples to test laboratories.
4. Security and protection of samples and test equipment at the project site.

D. Coordination

The Contractor and each independent agency engaged to perform inspections, tests and similar services for the project shall coordinate the sequence of their activities so as to accommodate required services with a minimum of delay in the progress of the work. In addition, the Contractor and each independent testing agency shall coordinate their work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking of samples and similar activities.

1.4 Quality Assurance

Qualification for Service Agencies: Except as otherwise indicated, engage inspection and test service agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which are recognized in the industry as specialized in the types of inspections and tests to be performed.

1.5 Submittals

A. General

Refer to Division - 1 Section of "Submittals" for the general requirements on submittals. Submit a certified written report of each inspection, test or similar service, directly to the Architect / Engineer, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

B. Report Data

Written reports of each inspection, test or similar service shall include, but not be limited to, the following:

1. Name of testing agency or test laboratory.
2. Dates and locations of samples and tests or inspections.
3. Names of individuals making the inspection or test.
4. Designation of the work and test method.
5. Complete inspection or test data.
6. Test results.
7. Interpretations of test results.
8. Notation of significant ambient conditions at the time of sample-taking and testing.
9. Comments or professional opinion as to whether inspected or tested work complies with requirements of the Contract Documents.
10. Recommendations on re-testing, if applicable.

2.0 - PRODUCTS

Not applicable.

3.0 - EXECUTION

3.1 Repair and Protection

Upon completion of inspection, testing, sample-taking and similar services performed on the work, repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed finishes. Comply with the Contract Document requirements for "Cutting and Patching". Protect work exposed by or for quality control service activities and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION

## 1.0 - GENERAL

A. Summary: Shop drawings may be transmitted for approval by electronic format or by hard copies.

1. Digital Copies:

a. Shop drawing and product data submittals shall be transmitted to Architect's office in electronic (PDF) format via email at **submittals@lathanassociates.com**. Do not email or copy transmittals to Architect or engineer.

b. The intent of electronic submittals is to expedite the construction process by reducing paperwork and improving information flow.

**c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.**

d. After receiving approved digital submittals, **General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days.** Submittals are not considered complete until 2 copies have been received by the Architect. This may have a direct effect on pay requests or final payment.

e. The Architect will retain the two (2) hard copies of shop drawing submittals: one for project records, and one to be incorporated with Close-Out Documents for the Owner.

f. Prior to submitting electronic submittals, GC must sign electronic submittal agreement. Project will be either all electronic or all hard copy. We will not accept electronic submittals once we have begun with hard copies. A copy of this agreement is attached to this section.

**DIGITAL file name** shall include Architect Job No, Specification Section number and description. (e.g., 15-01, 06100 - Rough Carpentry). We will not accept files that are randomly named. (e.g. scan 1234 or from Xerox Copier, etc.) Digital submittals must still be stamped approved or approved as noted.

B. Submittal Procedures:

1. Coordinate submittals preparation with construction, fabrication, other submittals and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.

2. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

3. Processing: General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect no less than three (3) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with the sequence of construction, related specification divisions and finishes to be selected in comparison, engineers, consultants and owner's representatives. Allow no less than two (2) weeks for reprocessing.

NOTE: No extension of Contract Time and/or additional costs will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

4. Submittal Preparation: The following information must be included with each transmittal.
   a. Date
   b. Project name and architect's project number.
   c. Name of the General Contractor and contact within company.
   d. Subcontractor name.
   e. Supplier name.
   f. Description of item.
   g. Specification Section and name of that section.
   h. Name of the Manufacturer - Model / Style of Item.
   i. Only project specific items should be sent.

5. Transmittal Letter: Transmit samples, etc. with form that contains Architect's Job name and number, Specification Number, Product Name, Manufacturer name and Model number. On the form, record requests for data and deviations from requirements.

6. Contractors Action/Approval

   Include General Contractor's certification stamp that information has been checked and complies with requirements before submitting to architect. General Contractor's action stamp must include Approved or Approved as Noted.

   Information received without the contractor's stamp will be returned without any action taken by engineer or architect.

C. Submittal Schedule:

1. After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit at or before date of the Pre-Construction Conference.

2. Coordinate with a list of Subcontracts, Schedule of Values, List of Products and the Contractor's Construction Schedule.

3. Prepare the schedule in order by Section number. Provide the following information:

   a. Date for first submittal.
   b. Related Section number.
   c. Submittal category (Shop Drawings, Product Data or Samples).
   d. Name of the Subcontractor.
   e. Description of the Work covered.
   f. Date for the Architect's final approval.

D. Shop Drawings:

Submit newly prepared information drawn to scale. Indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Do not use Shop Drawings without an appropriate final stamp indicating action taken.
7. After receiving approved digital Shop Drawings, General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days. Submittals are not considered complete until 2 copies

have been received by the Architect. This may have a direct effect on pay requests or final payment.

**ALL MANUFACTURED ITEMS THAT ARE STRUCTURAL IN NATURE SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ALABAMA AND SUBMITTED FOR APPROVAL.**

E. Product Data:

1. Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, mark copies to indicate applicable information.

2. Include the following information:

   a. Manufacturer's printed recommendations.
   b. Compliance with trade association standards.
   c. Compliance with recognized testing agency standards.
   d. Application of testing agency labels and seals.
   e. Notation of dimensions verified by field measurement.
   f. Notation of coordination requirements.

3. Submittals:

   a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.

4. Distribution:

   a. Furnish copies to Installers, Subcontractors, Suppliers and others required for performance of construction activities.

   b. Do not use unmarked Product Data for construction.

F. Samples:

1. Submit samples as required/requested and for color/texture finish selections.

2. Include the following:

   a. Specification Section number and reference.

   b. Generic description of the Sample.

   c. Sample source.

   d. Product name or name of the Manufacturer.

   e. Compliance with recognized standards.

3. Refer to other Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar characteristics.

   a. Samples erected at site and not incorporated into the Work, or designated as the Owner's property, are the Contractor's property and shall be removed from the site.

G. Architect's Action:

1. Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with contract documents and specified characteristics is the Contractor's responsibility.

2. Action Stamp

a. The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.

b. Architect's Action Stamp will read as follows:

Reviewed by Lathan Associates Architects, P.C.
Date
Approved for Design as Noted Subject to Contractor Verifying Quantities and Dimensions

2.0 - PRODUCTS Not applicable.

3.0 - EXECUTION Not applicable.

END OF SECTION

ELECTRONIC SUBMITTAL REQUIREMENTS FOR
LATHAN ASSOCIATES ARCHITECTS, P.C.

1. Processing: General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect two (2) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with other engineers and consultants.

   NOTE: No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

2. Contractors Action / Approval
   Include General Contractor's electronic certification stamp that information has been checked by the General Contractor and complies with requirements of the Contract Documents before submitting to architect. General Contractor's action stamp must include **Approved** or **Approved as Noted**.

   Information received without the contractor's stamp will not be reviewed and no action will be taken by engineer or architect.

   **DIGITAL file name** shall include Architect Job No, Specification Section number and description. (e.g., 15-01, 06100 - Rough Carpentry). We will not accept files that are randomly named. (e.g. scan 1234 or from Xerox Copier, etc.)

3. Submittal Preparation:
   **Include the following information on transmittal / email.**
   a. Date
   b. Project Name and Architect's Project Number.
   c. Name of the General Contractor and Contact within company.
   d. Subcontractor/Supplier.

   Clearly state **Number** and title of appropriate Specification Section and **Description** of Item and if applicable

   a. Name of the Manufacturer.
   b. Model / Style of Item.

4. **Electronic submittals will only be accepted when emailed to: submittals@lathanassociates.com**

   DO NOT COPY ARCHITECTS OR ENGINEERS WITH THE SUBMITTAL

5. After receiving approved submittals, **General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days.** Submittals are not considered complete until these copies are received by the Architect and may have a direct effect on Pay Requests and / or final payment.

I have read the above requirements and agree to the terms set forth in this document.

_____ by:_____
General Contractor Authorized Signature

_____
Architect Job Name and Number

## 1.0 GENERAL

1.1 Section Includes:
- A. General requirements for product options and substitution procedures.
- B. Material and product options.
- C. Substitutions.
- D. Coordination
- E. Substitution Request Form.

1.2 Related Sections:
- A. Section 01025 - Summary of Work
- B. Section 01040 - Project Coordination
- C. Section 01350 - Shop Drawing Submittals
- D. Section 01400 - Materials and Equipment
- E. Section 01900 - Warranties
- F. Section 01910 - Close Out Procedures
- G. In addition to "General Conditions of the Contract", comply with product option and substitution requirements specified in this Section.

1.3 Material and Product Options:
- A. Materials and products specified by reference standards, by performance, or by description only:
  1. Any product meeting specified requirements.

- B. Materials and products specified by naming products of one or more manufacturers with a provision for an equivalent product:
  1. Submit one of the products listed which complies with specified requirements or submit a Request for Substitution for a product of manufacturer not specifically named which complies with specified requirements.

- C. Materials and products specified by naming products of several manufacturers meeting specifications:
  1. Submit one of the products listed which complies with specified requirements or submit a Request for Substitution for a product of manufacturer not specifically named which complies with specified requirements.

1.4 Substitutions:
- A. After date of Notice to Proceed, Architect / Engineer will consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a material or product becomes unavailable due to no fault of Contractor or as follows:
  1. Lockouts
  2. Strikes
  3. Bankruptcy
  4. Discontinuation of products
  5. Proven shortage
  6. Other similar occurrences

- B. Each proposed substitution of materials or products for that one specified is a representation by Contractor that he has personally investigated the substitution and determined that the proposed substitution is equivalent or superior to that specified in quality, durability and serviceability, design, appearance, function, finish, performance, and of size and weight which will permit installation in spaces provided and allow adequate service access. Additionally, Contractor agrees that it

will provide and/or do the following:

1. Same warranty on substitution as for specified product or materials;
2. Coordinate installation and make other changes that may be required for Work to be complete in all respects;
3. Waive claims for additional costs which may subsequently become apparent;
4. Verify that proposed materials and products comply with applicable building codes and governing regulations and, where applicable, has approval of governing authorities having jurisdiction.

C. The Architect/Engineer will review requests from Contractor for substitutions with the Owner. Contractor shall not purchase or install substitute materials and products without written approval. The Architect/Engineer will give written notice to Contractor and the Owner of acceptance or rejection within a reasonable time.

D. Document each request for substitution with complete data substantiating compliance of proposed substitution with Contract Documents. Contractor shall use the *Substitution Request Form* along with appropriate attachments and submit them to the office of the Architect. A copy of the *Substitution Request Form* is included at the end of this Section.

1. Documents, as appropriate, shall include the following:
   a. Reason for the proposed substitution;
   b. Change in Contract Sum and Contract Time, if any;
   c. Effect on work progress schedule and completion date;
   d. Changes in details and construction of related work required due to substitution
   e. Drawings and samples
   f. Product identification and description
   g. Performance and test data
   h. Itemized comparison of the qualities of the proposed substitution to the product specified including durability, serviceability, design, appearance, function, finish, performance, size and space limitations, vibration, noise, and weight
   i. Availability of maintenance service, source and interchangeability of parts or components
   j. Additional information as requested.

E. In the event of credit change in the cost, the Owner shall receive all benefit of the reduction in cost of the proposed substitution. Credit shall be established prior to final approval of the proposed substitution and will be adjusted by Change Order.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, without having been reviewed and approved by Contractor, or when acceptance will require substantial revision of Contract Documents without addition compensation to the Architect / Engineer.

G. In the event that the Contractor or Subcontractor has neglected to place an order for specified materials and products to meet the work progress schedule, specified requirements, color schemes or other similar provisions, such failure or neglect shall not be considered as legitimate grounds for an extension of completion time nor shall arbitrary substitutions be considered to meet completion date.

H. Only one request for substitutions will be considered for each product. When substitutions are not accepted, the Contractor shall provide specified product.

I. Should substitution be accepted, and substitution subsequently is defective or

otherwise unsatisfactory, Contractor shall replace defective material or product with specified material or product at no cost to Owner.

1.5 Coordination:

A. When a specified, optional, specified by reference standard, or proposed substitution item of equipment or material is submitted which requires minor changes or additions to the designed structure, finishes or to mechanical and/or electrical services due to its requirements being different from those shown on the Contract Documents, itemize the changes required and attach to submittal. Do not proceed with changes without written approval from the Architect / Engineer.

B. Contractor shall make adjustments and changes required to coordinate Work for installation of optional materials and products, approved substitutions and materials and products specified by reference standards without additional costs to Owner or Architect/ Engineer.

2.0 PRODUCTS

Not applicable.

3.0 EXECUTION

Not applicable.

END OF SECTION

# PRIOR APPROVAL / SUBSTITUTION REQUEST FORM

**Date:** _____

**Company Submitting Request:** _____
(Name and Address)

_____

**Contact Name:** _____ **Phone:** _____ **Fax:** _____

**E-Mail:** _____

**PROJECT NAME:** _____

**SPECIFIED ITEM:** _____
(Section) (Page) (Description)

The undersigned requests consideration of the following product substitution:

**PROPOSED SUBSTITUTION:** _____
Provide Product Name / Model /Manufacturer

1. Attached data includes: _____ Product Description _____ Performance and Test Data
   _____ Drawings _____ Specifications _____ Photographs

2. _____ Yes / No changes will be required to the Contract Documents for the proper installation of proposed product substitution. If yes, then attach data that includes description of changes.

**The undersigned states that the following paragraphs, unless modified by attachments, are correct:**

1. The proposed substitution does not affect dimensions shown on the drawings.

2. No changes to the building design, engineering design, or detailing are required by the proposed substitution.

3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or **specified warranty requirements.**

4. No maintenance is required by the proposed substitution other than that required for originally specified product.

5. Other Information

**The undersigned further states that they have read the corresponding specification section in the project manual and confirms that the function, appearance and quality of the proposed substitution are equivalent or superior to the originally specified product.**_____initial.

Signature: _____ Printed Name: _____

Fax Number: _____

---

**For Architect's Use:**

____ Accepted ____ Accepted As Noted ____ Incomplete Information

____ Not Accepted ____ Received Too Late ____ No Substitutions Accepted For This Product

Reviewed By / Date: _____

Processed by Addendum No. _____

Comments: _____

_____

## 1.0 - GENERAL REQUIREMENTS

1.1 Products and Materials

A. Products, materials and manufactured items or articles of like nature shall, as nearly as possible, be of one brand or manufacturer. No changes or substitutions shall be made without written consent of the Architect. In selection of colors and patterns, the Architect reserves the right to select from the manufacturer's running pattern line (within same price range) of the materials called for in the Specifications without the added cost to the Owner.

B. All products and materials used for this project shall be asbestos free.

1.2 Trade Names

The use of manufacturer's names and serial numbers are given to establish a standard of manufacture and not intended to be restrictive or preferential. Similar, equal, and approved materials of other manufacturers will be acceptable, subject to the approval of the Architect, pursuant to requirements set forth in INSTRUCTIONS TO BIDDERS and as required by the Specifications.

1.3 Measurements

Before ordering any material or doing any work, the Contractor shall verify all measurements of the building and shall be responsible for correctness of same. No extra charge or compensation will be allowed because of differences between actual measurements and the dimensions indicated on the Drawings. Any differences which may be found, shall be submitted to the Architect for consideration before proceeding with the work.

1.4 Salvageable Material

Any salvageable material and/or equipment shall remain the property of the Owner and, upon removal from its existing location, shall be stored where directed by the Architect.

In the event that the Owner does not wish to keep the salvaged material, it shall be the responsibility of the Contractor to remove same promptly from the site.

Salvageable material shall include those items indicated on the drawings as items to be reused or relocated. Remove all finish hardware from doors noted to be removed under demolition. Tag and label finish hardware as to door function (and label), and turn over to Owner.

Coordinate with Architect on questionable salvage items.

1.5 Unused Materials

Unused excess materials purchased for this project and charged against the contract shall be the property of the General Contractor and removed upon final completion.

END OF SECTION

# SECTION 01410 – QA/ QC, STRUCTURAL TESTS, AND STRUCTURAL SPECIAL INSPECTIONS

## 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 required for compliance with the International Building Code, Chapter 17, Structural Tests and Special Inspections as well as specific quality-assurance and -control requirements for individual construction activities as referenced in the Sections that specify those activities.

B. Structural testing and special inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve contractor of responsibility for compliance with other construction document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
2. Requirements for contractor to provide quality-assurance and quality-control services required by architect, owner, or authorities having jurisdiction are not limited by provisions of this section.

C. The owner will engage one or more qualified special inspectors and / or testing agencies to conduct structural tests and special inspections specified in this section and related sections and as maybe specified in other divisions of these specifications.

### 1.3 DEFINITIONS

A. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official and the Structural Engineer of Record.

B. Construction Documents: Written (including specifications), graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications issued by the registered design professional beyond those issued for a building permit.

C. Shop Drawings / Submittal Data: Written, graphic and pictorial documents prepared and / or assembled by the contractor based on the Construction Documents.

D. Structural Observation: Visual observation of the structural system by a representative of the registered design professional's office for general conformance to the approved construction

documents. Structural observations are not considered part of the structural tests and special inspections and do not replace inspections and testing by the testing agency or special inspector.

D. Special Inspector: A qualified person who demonstrating competence, to the satisfaction of the code enforcement official and registered design professional in responsible charge, for inspection of the particular type of construction or operation requiring special inspection. The special inspector shall be a licensed professional engineer or engineering intern or a qualified representative from the testing agency.

E. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

F. Special Inspection, Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

G. Testing Agency: A qualified materials testing laboratory under the responsible charge of a licensed professional engineer, approved by the code enforcement official and the registered design professional in responsible charge, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with construction documents.

## 1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329-03 Standard Specification for Agencies in the Testing and / or Inspection of Materials Used in Construction.
      a. Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329. Certification by organizations other than those listed must be submitted to the building official for consideration before proceeding with work.

   2. Additional minimum qualifications of inspection and testing agencies and their personnel inspecting and testing concrete and concrete related work shall be as follows:
      a. An independent agency, acceptable to the Structural Engineer of Record qualified according to ASTM C 1077.
      b. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
      c. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

   3. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.

## 1.5 CONFLICTING REQUIREMENTS, REPORTS, AND TEST RESULTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most

stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the registered design professional in responsible charge for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the registered design profession in responsible charge for a decision before proceeding.

C. The special inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.

D. Where a conflict exists between the construction documents and approved shop drawings / submittal data, the construction documents shall govern unless the shop drawings / submittal data are more restrictive. All conflicts shall be brought to the attention of the registered design professional in responsible charge.

## 1.6 SUBMITTALS BY SPECIAL INSPECTOR AND / OR TESTING AGENCY

A. Special inspectors shall keep and distribute records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge, contractor, architect, and owner. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and the building official prior to the start of work.
    1. Special inspection reports and test results shall include, but not be limited to, the following:
        a. Date of inspection.
        b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc.).
        c. Statement noting that the work, material, and / or product conforms or does not conform to the construction document requirements.
            1) Name and signature of contractor's representative who was notified of work, material, and / or products that do not meet the construction document requirements.
        d. Name and signature of special inspector and / or testing agency representative performing the work.
        e. Additional information as required herein.

B. Schedule of Non-Compliant Work: Each agent shall maintain a log of work that does not meet the requirements of the construction documents. Include reference to original inspection / test report and subsequent dates of re-inspection / retesting.

C. Reports and tests shall be submitted within 1 week of inspection or test. Schedule of Non-Compliant Work shall be updated daily and submitted at monthly intervals.

D. Concrete Test Reports: Test results shall be reported in writing to Architect, Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests

shall contain:

1. Project identification name and number.
2. Date and time of concrete placement.
3. Mix design number or identification.
4. Design compressive strength at 28 days.
5. Design Air Content.
6. Design Slump.
7. Location of concrete batch in Work.
8. Time concrete was batched.
9. Amount of water withheld at plant.
10. Amount of water added at site.
11. Temperature of mix at point of placement.
12. Slump at point of placement
    a. When use of a Type I or II plasticizing admixture conforming to ASTM C 1017 or when a Type F or G high range water reducing admixture conforming to ASTM C494 is used, slump shall be measured and report both before addition of the admixture and at the point of placement.
13. Air content.
14. Name of concrete testing and inspecting agency.
    a. Name of Laboratory Technician and ACI Certification Number.
    b. Name of Field Technician and ACI Certification Number.
15. Compressive breaking strength.
16. Type of break.

E. Final Report of Special Inspections. Submitted by each agent listed in the schedule of Structural Testing and Special Inspections.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

A. The contractor shall coordinate the inspection and testing services with the progress of the work. The contractor shall provide sufficient notice to allow proper scheduling of all personnel. The contractor shall provide safe access for performing inspection and on site testing.

B. The contractor shall submit schedules to the owner, registered design professionals and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring structural tests and special inspections.

C. The contractor shall repair and / or replace work that does not meet the requirements of the construction documents.

a. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
b. Engineer / architect shall be registered in the state in which the project is located. Engineer shall be acceptable to the registered design professional in responsible charge, code enforcement official, and owner.
c. Procedures shall be submitted for review and acceptance by the registered design professional in responsible charge, code enforcement official, and owner before proceeding with corrective action.

D. The contractor shall be responsible for costs of:
a. Re-testing and re-inspection of materials, work, and / or products that do not meet the requirements of the construction documents and shop drawings / submittal data.
b. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
c. Repair or replacement of work that does not meet the requirements of the construction documents.

## 3.2 STRUCTURAL OBSERVATIONS

A. Structural observations may be made periodically as determined by the registered design professional in responsible charge.

## 3.3 TESTING AND INSPECTION

A. Testing and inspection shall be in accordance with the attached Schedule of Special Inspections, as listed elsewhere in the project documents, and as listed herein.

B. Inspection of Fabricator's QC procedures

1. Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator AND metal truss fabricators.

i. Exception: AISC Certified Steel Fabricators that submit a "Certificate of Compliance" at completion of their scope of work.

C. Soils, Periodic Inspection.

1. Verify bearing capacities of soils beneath footings is in accordance with the approved project soils report and earthwork specifications.

2. Verify assumed bearing capacities (As noted on the drawings, recommended by the geotechnical engineer, and specified in earthwork specifications.) and determine settlements of soils beneath footings and building pad.

3. Verify site preparation prior to beginning fill placement. Verify fill material type, placement method, lift thickness, and compaction of fill material. Verify in-place density of compacted fill.

i. As recommended in approved soils report and specified in earthwork specifications.

D. Concrete, Continuous Inspection

1. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

    i. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

    ii. 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; 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, 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; one test hourly when air temperature is 40 deg F and below and when 80 deg F 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.

    i. Unit Weight is only required for lightweight concrete

6. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimens at 7 days, one set of two specimens at 28 days, and hold one in reserve for later testing as directed by the Structural Engineer of Record.

    i. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

7. Inspect bolts to be installed prior to and during placement of concrete.

8. Inspect concrete placement to verify operations are in accordance with project requirements.

    i. Verify correct mix is used.

E. Concrete, Periodic Inspection

1. Floor flatness:

    i. Measure floor and slab flatness and levelness according to ASTM E 1155 within **24** hours of finishing..

2. Inspect concrete formwork prior to concrete placemen, except as noted. Verify that construction joints are properly keyed. Verify that slab recesses, if any, have been installed.

3. Inspect reinforcing steel prior to concrete placement, except as noted, for installation including size, spacing and bar clearances. Verify that lap splices and embedment lengths

are per the construction documents. Verify that dowels for work above are properly aligned and spaced to match other work.

4. Inspect all concrete curing operations and verify they are in accordance with project requirements.

F. Masonry, Periodic Inspection

1. At beginning of masonry construction:

    i. Inspect proportions of site prepared mortar and grout.

    ii. Inspect construction of mortar joints.

    iii. Inspect reinforcement for correct size and spacing.

2. At beginning of masonry construction and every 1000 square feet of masonry thereafter

    i. Inspect work for size and location of structural elements

    ii. Inspect work for correct location and type of embeds and anchor bolts.

    iii. Specified size, grade, and type of reinforcement.

3. Prior to grouting

    i. Inspect masonry cells and cleanouts prior to placement of grout. Verify spaces are clear.

    ii. Inspect any site prepared grout proportions.

    iii. Inspect placement of reinforcement.

    iv. Inspect construction of mortar joints

4. Inspect protection of masonry during cold weather and hot weather.

    i. During periods with temperatures below 40 degrees or above 90 degrees.

5. Verify compliance with all required inspection provisions of the construction documents and approved submittals.

G. Steel Construction, Periodic Inspection

1. Inspect high-strength bolts, nuts and washers:

    i. Identify markings to conform to ASTM standards specified in the construction document.

    ii. Inspect manufacturer's certificate of compliance.

2. Inspect high-strength bolting: Bearing-type connections.

3. Inspect and verify structural steel material:

i. Identification markings to conform to ASTM standards specified in the approved construction documents.

ii. Manufacturers' certified mill test reports.

4. Inspect and verify weld filler materials:

i. Identification markings to conform to AWS specification in the approved construction documents.

ii. Manufacturer's certificate of compliance required

5. Inspect welding: Structural Steel:

i. Single-pass fillet welds ≤ 5/16

ii. Metal roof deck connections.

H. Trusses, Periodic Inspection

1. Inspect metal roof trusses and shop built components.

i. Inspect truss production in shop unless fabricator is approved by building official and submits certification of compliance at end of scope of work. Inspect 10% of trusses. Inspect 100% of trusses if discrepancies are observed.

2. Inspect site-built assemblies including site built trusses. Inspect erected trusses including bridging and attachments.

i. Inspect all site-built trusses. Inspect erected trusses and installation of bridging.

3. Inspect connection of truss elements including number of screws and attachment of connections of individual truss components.

4. Inspect truss to truss connections and truss to structure connections.

5. Inspect high-load diaphragms.

i. Inspect all diaphragms after installation is complete.

6. Inspect restraint/bracing.

i. For trusses spanning greater than 60ft, verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

I. Special Inspection for Wind Resistance, Periodic Inspection

1. Roof Cladding and Roof Framing Connections.

2. Wall Connections to Roof.

3. Diaphragms connections to framing.

J. Reference related specifications for the minimum level of inspections and testing. Provide

additional inspections and testing as necessary to determine compliance with the construction drawings.

PART 4 - SCHEDULES AND FORMS (ATTACHED)

# Statement of Special Inspections

Project:

Location:

Owner:

Design Professional in Responsible Charge:

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing
☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Weekly* or ☐ per attached schedule.

Prepared by:

_____
(type or print name)

_____
Signature Date

*Design Professional Seal*

Owner's Authorization:

_____
Signature Date

Building Official's Acceptance:

_____
Signature Date

Final Report of Special Inspections

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Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

*(Attach continuation sheets if required to complete the description of corrections.)*

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

_____
(Type or print name)

_____
Signature Date

*Licensed Professional Seal*

**Agent's Final Report**

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

*(Attach continuation sheets if required to complete the description of corrections.)*

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Agent of the Special Inspector

(Type or print name)

Signature Date

*Licensed Professional Seal or Certification*

Quality Assurance for Wind and Impact Requirements

Basic Wind Speed (3 second gust) – 250 MPH

Wind Exposure Category - C

Quality Assurance Plan Required (Y/N) - Y

Description of wind force resisting system and designated wind resisting components:

The shelter roof consists of precast concrete hollow core slab panels with concrete topping that creates an impact resistant covering for the shelter and a diaphragm to transfer lateral forces to load bearing shear walls. These walls consist of reinforced concrete masonry wall filled with grout. The load path for wind forces is critical for the construction of the shelter. This load path consists of the connection of the precast panels and topping slab to the walls, the laps and grouting of the rebar in the walls, the connection of the walls to the footing, and the construction of the footing.

Structural observations by the design professional shall be performed to conduct visual observation of the construction of the shelter for the items noted above. This observation is in addition to the inspections, to be performed by the Owner's testing agent and special inspector, outlined in the schedule of special inspections and in other areas of the contract drawings.

The reports for the testing, inspections and structural observations shall be reported to the Design Professional in Responsible Charge (DPRC) of the Special Inspections as outlined on the Statement of Special Inspections. The DPRC shall distribute or cause to be distributed to the Owner, Architect and Engineers of Record as well as the building Official.

Each contractor, responsible for the construction of any portion of the shelter, shall thoroughly review the Quality Assurance Plan, Schedule of Special Inspections, and the Construction Drawings and sign the attached Contractor's Statement of Responsibility.

Contractor's Statement of Responsibility

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Each contractor responsible for the construction or fabrication of a system or component designated in the Quality Assurance Plan must submit a Statement of Responsibility.

Project:

Contractor's Name:

Address:

License No.:

Description of designated building systems and components included in the Statement of Responsibility:

**Contractor's Acknowledgment of Special Requirements**

I hereby acknowledge that I have received, read, and understand the Quality Assurance Plan and Special Inspection program.

I hereby acknowledge that control will be exercised to obtain conformance with the construction documents approved by the Building Official.

_____ _____

Signature Date

**Contractor's Provisions for Quality Control**

Procedures for exercising control within the contractor's organization, the method and frequency of reporting and the distribution of reports is attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement.

Fabricator's Certificate of Compliance

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Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

_____ _____

Signature Date

_____

Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual

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## 1.0 - GENERAL

1.1 Related Documents

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division - 1 Specifications Sections, apply to work of this Section. See drawings for additional Demolition and Protection Requirements not stated herein.

1.2 Description of Work

A. Extent of selective demolition work as indicated on drawings and/or as required for completion of finish work.

B. Types of Selective Demolition Work: Demolition requires the selective removal and subsequent offsite disposal of the following:

1. It is the intent for all required existing building components, systems, related structure, materials, etc., be removed and/or relocated to allow for completion of new construction, whether indicated or not.

2. All abandoned components, systems and related wiring, piping, ductwork, controls, fixtures, etc., shall be removed from job site, whether specifically indicated or not. Refer to Civil, Structural, Plumbing, Mechanical and Electrical drawings and specifications for respective demolition requirements and coordinate with Architectural.

3. See drawings for other demolition items.

1.3 Submittals

A. Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

B. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

C. Existing building function and operation shall be maintained during construction unless scheduled and approved by the Owner. Work schedule shall vary as required to complete work as required.

D. Existing facilities shall be maintained in operation during construction. Protect and/or relocate all utilities, service, security systems, satellite communications, data systems, etc., as required to ensure continuous operation and function. Temporary relocation and utility outages shall be scheduled and approved by the Owner.

1.4 Job Conditions

A. Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

B. Owner and Architect assume no responsibility for actual condition of items or structures to be demolished.

C. All salvageable materials, as selected by Owner, shall be removed, stored, and / or delivered to Owner as directed. Salvageable materials shall be protected during removal and delivery. All items of salvage not wanted by the Owner shall be the property of the General Contractor and removed from job site.

D. Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

1. All paths to and from exits and entrances shall be maintained during construction. Provide temporary barricades, fences, warning signs, etc., as required, interior and exterior, to protect building occupants and pedestrians during construction and demolition.

2. Erect temporary covered passageways as required by authorities having jurisdiction.

3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

5. Protect floors with suitable coverings when necessary.

6. Construct temporary insulated solid dust proof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.

7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

8. Remove protections at completion of work.

E. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

F. Traffic:

1. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

2. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Explosives: Use of explosives will not be permitted.

H. Utility Services:

1. Maintain existing utilities indicated to remain, keep in service and protect against damage during demolition operations.

2. Do not interrupt existing utilities or fire alarm/fire protection systems serving occupied or used facilities, except when authorized in writing by

authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities. Repair damages to such immediately.

I. Environmental Controls:

1. Use water sprinkling, temporary enclosures and other suitable methods to limit dust and dirt, interior and exterior, from rising and scattering in air to lowest practical level. **COMPLY WITH GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.**

2. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding and pollution.

## 2.0 - PRODUCTS

Products are not applicable to this section.

## 3.0 - EXECUTION

### 3.1 Inspection

Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure surfaces, equipment or of surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's representative prior to starting work.

### 3.2 Preparation

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

B. Cease operations and notify the Owner's representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

C. Cover, protect, and relocate furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

D. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

E. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4" studs, 5/8" drywall (joints taped) on occupied side, 1/2" fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.

F. Provide weatherproof closures for exterior openings resulting from demolition work.

G. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

H. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change over.

### 3.3 Demolition

A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

1. Demolish concrete and masonry in all sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, roofs or framing.

3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

4. For interior slab on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

5. Existing ceramic tile floor finishes shall be removed down to the top of the existing dropped slab.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.4 Disposal of Demolished Materials

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site. Pay all related fees and costs.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

C. Burning of removed materials is not permitted on project site.

3.5 Clean-Up and Repair

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Scope of Work

A. Demolition shall, unless otherwise noted, included removal of existing objects or improvements, whether indicated or not, that would in any way prevent or interfere with progress or completion of proposed.

B. Permits, fees and licenses shall be secured and paid for by Contractor, including disposal charges as required to ensure progress of work will proceed.

C. Work shall comply with the latest edition of city ordinance or regulations and/or requirements of any governing authorities or utility owners in demolition of existing pavement, curbs and gutters, drainage structures and utilities as may be required.

D. Demolition requires removal and disposal off-site in a legal manner of the following:

1. All demolished carpet, carpet glue or anything related to carpet system.

2. All demolished wallcovering, glue or anything related to wallcovering system.

3. Wood base and shoe mould that is required to be removed for proper vinyl wallcovering and carpet installation. Any wood base and shoe mould that is damaged during demolition shall be removed and disposed.

### 1.2 Job Conditions

A. Occupancy: Areas to be demolished will remain in use for duration of work.

B. Condition of Structures:

1. Owner assumes no responsibility for actual condition of materials to be demolished.

2. Conditions existing at time of the inspection for bidding purposes will be maintained by Owner insofar as practicable. Variations within structures may occur by Owner's removal and salvage prior to start of demolition work.

C. Partial Removal:

1. Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.

2. Storage or sale of removed items on site will not be permitted.

D. Protections:
Ensure safe passage of persons around areas of demolition. Conduct operations to prevent damage to adjacent buildings, structures, other facilities and injury to persons.

E. Damages:
Promptly repair damages caused to adjacent facilities, etc., by demolition operations at no cost to Owner.

2.0 PRODUCTS (Not Applicable)

3.0 - EXECUTION

3.1 Demolition

A. Pollution Controls

1. Use suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

2. Clean adjacent areas and improvements of dust, dirt and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3. Protect all items remaining within building as required and clean all areas prior to final inspection.

B. Scaffolding, Barricades, Shoring, etc.
Scaffolding, barricades, shoring, etc. as required shall be provided by the Contractor in compliance with all recognized safety rules and prevailing laws, codes or ordinances applicable thereto. All such scaffolding, barricades, shoring, etc., shall remain until construction has been completed. The Contractor, upon completion, shall remove any and all scaffolding, barricades, shoring, etc., and leave site clean from debris and make ready for other construction or use.

C. Protection

1. Existing walks, curbs, drives, other improvements on or near the site that are to remain, shall be properly protected from damage of any kind by the Contractor during the entire construction operation. Improvements that are damaged shall be replaced to the satisfaction of the Architect at the Contractor's expense.

2. Provide all required protection as may be required by the governing governmental agencies for protection of the public on or near the site.

3.2 Disposal of Demolished Materials

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site. Pay all related fees and costs.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

3.3 Payment
Include all work in this section in lump sum.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work required under this Section consists of providing all labor, materials and equipment necessary to do all clean-up work; including, but not limited to, periodic cleaning, removal of temporary protection, removal of debris and final cleaning.

1.2 Related Sections

Administrative provisions and technical requirements specified under this Section are in addition to provisions for cleaning specified under various Sections of the Specifications and apply to each Section of Specifications.

1.3 Special Instructions

A. Contractor shall endeavor to keep interior free of dust and mud, take precautionary measures, and provide protective materials, such as insulated dust and noise partitions and gravel at all entries during dried-in stages of construction.

B. Upon completion of work in each area or part of the building and immediately prior to final inspection and acceptance of that respective area, that area shall be thoroughly cleaned and made ready for immediate occupancy by the Owner.

C. In case of failure to comply with the requirements of this Section for any part of the work within the time specified by the Architect, the Architect may cause the work to be done and deduct the price thereof from the Contract Price on the next succeeding monthly Application for Payment.

## 2.0 - PRODUCTS

2.1 Equipment

A. For periodic and final cleaning operations, use approved apparatus designed for the specific type of cleaning required and compatible with the particular materials to be cleaned.

B. Operate equipment in compliance with equipment manufacturer's instructions.

2.2 Materials

All soap, detergents, brushes, scrapers and other materials and accessories utilized in periodic and final cleaning shall be of a type recommended by the material manufacturer as being compatible with and non-injurious to the particular surface, material, equipment or finish to be cleaned.

## 3.0 - EXECUTION

3.1 Periodic Cleaning

A. The Contractor shall periodically, or as directed during the progress of the work, clean-up and remove from the premises all refuse, rubbish, scrap materials and debris caused by his employees, his Subcontractors or resulting from his work.

B. Such clean-up shall be sufficient to assure that at all times the premises are sanitary, safe, reasonably clean, orderly and workmanlike.

C. Remove oily rags and combustible waste, debris, rubbish and excess materials from the premises at the completion of each day's work, or more often, if required to keep the building and premises free from any accumulation of flammable and dangerous materials.

D. At no time shall any rubbish, debris or any other material be thrown from window or door openings nor into foundation trenches.

E. Clean areas prior to any painting work. Take care to settle and minimize dust before painting begins. Use commercial type vacuum cleaners.

F. Close rooms and areas where painting and decorating work is completed to all but authorized personnel.

G. All debris and waste materials shall become the property of the Contractor and shall be removed by him from the project site.

H. Remove Debris from roof tops daily.

I. Trim excess exposed dur-o-wall flush with face of CMU.

J. Keep adjacent paved driveways and roads clear of mud and debris intruded as a result of this work.

3.2 Removal of Temporary Facilities

A. Upon completion of work in each area or part of the building, remove temporary lighting, power, protection and enclosures and repair defects in materials and workmanship noted after removal of such.

B. Before final completion and final acceptance, the Contractor shall remove from the Owner's property, and from all public and private property, all tools, scaffolding, falsework, temporary structures and/or utilities including the foundations thereof (except as the Owner permits in writing to remain).

3.3 Final Cleaning

A. Before final completion and acceptance, the Contractor shall remove from the Owner's property, and from all public and private property, all refuse, rubbish, scrap and surplus material and debris caused by his employees, his Subcontractors, or resulting from his work, leaving the site clean and true to line and grade, and the work in a safe and clean condition, ready for use and operation.

B. Clean all painted, enameled, stained or baked enamel work to remove all marks, stains, smudges, fingerprints and splatters from such surfaces.

C. Clean and remove all stickers, labels, marks, stains, smudges and paint from all glass. Wash and polish all glass, including, but not limited to, that in mirrors, view windows and doors, on the interior and exterior. Scratched or marred glass shall be replaced.

D. Clean all hardware and metals to remove all stains, marks, smudges, fingerprints, dirt, dust, paint or other disfigurement and polish. Scratched, marred or otherwise disfigured hardware or metals shall be replaced.

E. Clean all tile and floor finishes of all kinds to remove all splatters, stains, paint, dirt and dust. Wash and apply a final coat of wax and polish all finished floors except concrete and carpet as recommended by the manufacturer or as required by the Architect.

F. Clean all manufactured articles, fixtures, materials, appliances and equipment to

remove all stickers, labels, rust stains and temporary covers.

G. Clean and condition all manufactured articles, fixtures, materials, appliances and equipment and all electrical, heating and air conditioning equipment as recommended or directed by the manufacturer.

H. Blow out or flush out all foreign matter from all dust pockets, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers and similar features of all appliances and equipment and all electrical, heating and air conditioning equipment as recommended or directed by the manufacturer.

I. Remove all paint from all identification plates on all appliances and equipment and all electrical, heating and air conditioning equipment and polish plates.

J. Exterior walks, steps, ramps and platforms shall be washed down, and broom cleaned to remove all dirt, dust, stains or other disfigurations.

K. Interior surfaces of all heating, ventilation and air conditioning ducts shall be damp or wet mopped or vacuum cleaned to remove all dirt and dust.

L. In general, leave all work clean and free of dirt, dust, smudges, stains, paint spots, mastic, caulk, sealant and other excess materials.

M. After final cleaning of building and prior to final balancing of heating and air conditioning system, all air filters shall be replaced with clean, new filters.

N. Upon completion of final cleaning, remove all cleaning equipment, materials and debris from the building and the premises.

END OF SECTION

## 1.0 - GENERAL

A. This Section shall adhere to *General Conditions of the Contract, Article 19, and DCM Form C-12,* as issued by The State of Alabama Department of Construction Management, a copy of which is included within this Specification Manual.

B. Should changes in the work constitute an increase or decrease in the Contract amount, the General Contractor shall submit a Change Order Request (COR) which shall include a number for identification, description and cost break down.

C. Contractor shall attach all supporting documentation, including, but not limited to the following:
   1. Breakdown of costs which shall include material, labor, delivery (freight), installation, taxes, and mark-up for overhead and profit.

   2. If a Subcontractor is used for the requested change, then supporting documentation listed for Item 1 shall also be provided by the Subcontractor and included with the COR.

D. In accordance with *General Conditions of the Contract, Article 19,* the General Contractor shall note the following:
   1. Mark-Up Procedures for Change Order with net addition to Contract:
      a. The General Contractor's mark-up for overhead and profit shall not exceed fifteen (15) percent.
      b. Where Subcontract work is involved, the total mark-up for the Contractor and Subcontractor shall not exceed twenty-five (25) percent.
      c. The Architect must be able to determine the total amount of mark-up, therefore, supporting documentation **must** state the mark-up of both the Subcontractor and the General Contractor.

   2. Mark-Up Procedures for Change Order with net Credit to Contract:
      "General Conditions of the Contract":
      **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work of no less than 5%.**

   3. Overhead "Indirect Costs": For the purposes of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change including but not limited to the following:
      a. Bonds
      b. Insurance
      c. Superintendent
      d. Job Office Personnel
      e. Watchman
      f. Job Office, office supplies and expenses
      g. Temporary facilities and utilities
      h. Home office expenses

## 2.0 – PRODUCTS (Not Applicable)

## 3.0 - EXECUTION

A. General Contractor shall submit COR to Architect for review and approval. If approved, the Architect will submit to Owner for final approval. Upon approval by the Owner, the Architect will prepare required number of copies of Change Order DCM Form C-12 (local) or DCM

Form C-12 (PSCA) and forward to General Contractor.

B. Three (3) copies of Change Order are required for locally funded projects and three (3) copies are required for PSCA funded projects. All copies must be signed by the General Contractor's Bonding Company with Power of Attorney attached.

- **In close coordination with the Alabama State Department of Education (ALSDE), as of October 1, 2022, all fully locally-funded K-12 projects' O/A Agreements, Amendments, Construction Contracts and Changes Orders must be submitted electronically via DocuSign links available at https://dcm.alabama.gov/forms_publicK12.aspx. Exception: any forms submitted on paper prior to October 1, 2022 will be processed to completion on paper.**

C. Sequence of execution shall be as follows:

1. General Contractor signs all copies of Change Order. Note: Change Order must be signed by an Officer within the company.
2. General Contractor forwards Change Order to their Bonding Company.
3. Bonding Company signs each copy and returns same to G. C.
4. G. C. forwards Change Order to Architect.
5. Architect forwards Change Order to local Board of Education.
6. Superintendent of local Board of Education executes and returns Change Order to Architect.
7. Architect forwards Change Order to either the State Department of Education (local funded projects) or to The State of Alabama Department of Construction Management (PSCA funded projects).
8. All parties will receive a copy of fully executed Change Order from the appropriate state agency for their permanent records.

D. General Contractor may include cost of Change Order on Pay Application only after receipt of fully executed Change Order. This cost shall be included on Pay Application as a separate line-item listing change order number and amount. Billing shall be for the percentage of work completed for the change order within the month covered by that Pay Application.

E. All change(s) in the work shall require approval by the Owner, through the Architect, in advance of the commencement of any work associated with the change(s).

F. Charges against Allowances shall **not** include General Contractor's mark-up.
*- Refer to Specification Section 01020 - Allowances -*

G. Refer to "*General Conditions of the Contract*" - "*DCM Form C-8* for additional information.

END OF SECTION

## 1.0 - GENERAL

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.
   1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

C. Warranties
   1. Subcontractors: General Contractor shall provide a one-year warranty from each Subcontractor they have under contract for the project.

   2. Vendors/Suppliers: General Contractor shall obtain a one-year warranty from each Vendor/Supplier for manufactured product used for the project. Example: *XYS Building Products, Inc.* shall provide a one-year warranty for each product they provided for the project, such as, *toilet partitions and hollow metal doors and frames.* This warranty may be on a form or letterhead provided by the Vendor/Supplier and must list all products provided for the project.

   3. Manufacturers: The Manufacturer's warranty for each product shall be placed directly behind the applicable Subcontractor or Vendor/Supplier's warranty within the warranty binder.

   4. Roof Warranties: The executed roofing warranties shall be presented at Final Inspection. Manufacturer's warranties cannot be prorated.

D. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's and limitations on product warranties do not relieve suppliers, manufacturer's and subcontractors required to countersign special warranties with the Contractor.

E. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

F. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

G. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

H. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise

available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

2. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

I. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

J. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier, or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

K. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper. Three (3) sets of warranties and close out documents are required: one set will be retained by the Architect and two sets will be delivered to the Owner.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the Installer.

2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.

3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

## 2.0 - PRODUCTS (Not Applicable)

## 3.0 - EXECUTION

The One-Year Warranty issued by the General Contractor shall list all disciplines they are covering when there is not a warranty from a Subcontractor. For instance, some General Contractors have Masons employed within their company and, therefore, do not contract Masonry work through a Masonry Subcontractor. In that case, the General Contractor's warranty would list Masonry as part of their itemized list of warranted work. Other typical examples are Painting, Rough Carpentry,

Miscellaneous Metals, etc.

Warranties shall bear the same date as the Date of Substantial Completion. All warranties shall be effective for a period of One Year from Date of Substantial Completion with exceptions for special warranties requiring extended periods of warranty coverage.

This list is designed as an aid to comply with close-out procedures; however, it should not be considered a complete and comprehensive list. General Contractor should review warranty requirements specified in Project Manual.

Warranties shall include, but not be limited, to the following:

Warranties from ALL Subcontractors for this project.

DIVISION 2 - SITE WORK
Site Work
Soil Poisoning
Earthwork
Lawns and Planting
Water Distribution
Hot-Mix Asphalt Paving
Site Concrete Walks, Curbs, & Paving
Fences and Gates

DIVISION 3 – CONCRETE
Cast-in Place Concrete
Structural Precast Concrete – Plant Cast

DIVISION 4 - MASONRY
Unit Masonry

DIVISION 5 -METALS
Structural Steel
Cold-Formed Metal Framing
Miscellaneous Metals

DIVISION 6 - CARPENTRY
Rough Carpentry
Finish Carpentry

DIVISION 7 - MOISTURE PROTECTION
Solvent Type Dampproof Coating
Building Insulation
Exterior Insulation and Finish System
Metal Wall Panels
Thermoplastic Polyolefin (TPO) Roofing System
Sheet Metal Work Flashing and Trim
Caulking and Sealants

**NOTE: Provide roofing warranties as stipulated in Division 7 of the specifications, and as required by The State of Alabama Department of Construction Management. Roofing warranties shall be presented at the time of Final Inspection.**

DIVISION 8 - WINDOWS AND DOORS
Hollow Metal Doors & Frames
Flush Wood Doors
Tornado-Resistant Assemblies
Vinyl Windows
Finish Hardware
Glass and Glazing

DIVISION 9 - FINISHES
Gypsum Drywall & Light Guage Metal Stud System
Tile
Acoustical Panel Ceilings
Resilient Rubber Base and Accessories
Paint

DIVISION 10 - SPECIALTIES
Markerboards and Tackboards
Interior Signage
Roof Identification Plaque
Toilet Accessories
First Aid Kit

DIVISION 12 - FURNITURE AND FURNISHINGS
Fire Extinguishers
Miscellaneous Furnishing and Fixtures
Laminate Clad Casework
Mini Blinds

DIVISION 15 – PLUMBING and FIRE PROTECTION
Plumbing Systems – Fixtures - Labor

DIVISION 15 - MECHANICAL – HVAC
Mechanical Systems – Equipment – Labor

DIVISION 16 - ELECTRICAL
Electrical Systems – Fixtures -Equipment – Material and Labor

**See attached WARRANTY FORMS immediately following for General Contractors and Subcontractors.**

## GENERAL CONTRACTOR WARRANTY FORM

**G. C.' S PROJECT NO.** _____ **ARCHITECT'S PROJECT NO:** _____

**PROJECT NAME:** _____

**GENERAL CONTRACTOR:** _____

(Name and Address) _____

_____

**PROJECT OWNER:** _____

**ARCHITECT:** Lathan Associates Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244

**PROJECT SUBSTANTIAL COMPLETION DATE:**

This is to certify that we, _____, the General Contractor for the above referenced project, per contract documents, warrant all labor, material and equipment provided and performed for a period of One (1) Year from the Date of Substantial Completion indicated above.

If applicable, we warrant additional work, materials and equipment for One (1) Year on the following:

_____

_____

_____

_____

**By:** _____
(Name and Title)

**Dated this** _____ **day of** _____

---

State of Alabama
County of _____

Sworn to and subscribed before me this

_____ day of _____

_____
Notary Public

My Commission Expires: _____

## SUBCONTRACTOR WARRANTY FORM

**G. C.' S PROJECT NO.** _____ **ARCHITECT'S PROJECT NO:** _____

**PROJECT NAME:** _____

**GENERAL CONTRACTOR:** _____

**SUBCONTRACTOR:** _____

(Name and Address) _____

_____

**PROJECT OWNER:** _____

**ARCHITECT:** Lathan Associates Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244

**PROJECT SUBSTANTIAL COMPLETION DATE:**

We, _____ (name), Subcontractor for _____ (work),
as described in Specification Section(s) _____, do hereby warrant that all labor and materials provided and performed in conjunction with above referenced project are in accordance with the Contract Documents and will be free from defects due to defective materials and/or workmanship for a period of One (1) year from the Date of Substantial Completion indicated above or as required by the Specification Section relevant to your trade.

Should any defect develop during the warranty period due to improper materials and/or workmanship, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner.

The Owner will give Subcontractor written notice of defective work. Should Subcontractor fail to correct defective work within Thirty (30) days after receiving notice, the Owner may, at his option, correct defects and charge Subcontractor cost for such correction. Subcontractor agrees to pay such charges upon demand.

---

Warranty applies to the following Work: _____

_____

By: _____
(Name and Title)

Dated this _____ day of _____

## 1.0 - GENERAL

A. Closeout requirements for specific construction activities are included in the appropriate Sections in Division 2 through 16.

B. Final Inspection Procedures: See Section 01030 - Special Project Requirements for Inspection Requirements
   1. Deliver tools, spare parts, extra stock, and similar items.
   2. Changeover locks and transmit keys to the Owner.
   3. Complete startup testing of systems and instruction of operation and maintenance personnel. **Obtain signature(s) of all Owner's personnel participating in operation and maintenance instructions.**
   4. Remove temporary facilities, mockups, construction tools, and similar elements.
   5. Complete final cleanup requirements, including touchup painting.
   6. Touch up and repair and restore marred, exposed finishes.

C. After Substantial Completion has been achieved, the General Contractor shall:
   1. Submit final payment request with releases and supporting documentation. Include insurance certificates where required.
      a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete. Include supporting documentation for completion and an accounting of changes to the Contract Sum.
      b. Advise the Owner of pending insurance changeover requirements.
      c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
      d. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
      e. Deliver tools, spare parts, extra stock, and similar items.
      f. Changeover locks and transmit keys to the Owner.
      g. Complete startup testing of systems and instruction of operation and maintenance personnel. Obtain signature(s) of all Owner's personnel participating in operation and maintenance instructions.
   2. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
   3. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.
   4. Submit Consent of Surety to final payment.
   5. Submit Release of Liens.
   6. Submit a final settlement statement.
   7. Submit evidence of continuing insurance coverage complying with insurance requirements.

D. Record Drawings: Maintain a set of prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.
   1. Mark sets with red pencil.
   2. Mark completed record drawings: "As-Built" Set.
   3. Upon completion of the Work, submit record drawings to the Architect for the Owner's records in the form of two (2) CD's.

E. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data. Mark cover of set: "As-Built".

Upon completion of the Work, submit record Specifications to the Architect for the Owner's records in the form of two (2) CD's.

*Note: If space allows, both "As-Built" plans and specs may be scanned and saved onto a single CD and 2 copies of record CD's shall be submitted.*

F. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 3-ring binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.

G. Close-Out Documents

Close-Out Documents consists of the following:

1. General Contractor's Warranty
2. Subcontractors' Warranties
3. Manufacturers' Warranties
4. Affidavit of Advertisement of Completion
5. Consent of Surety to Final Payment
6. Contractor's Affidavit of Release of Liens
7. Operating and Maintenance Manuals / Instructions to Owner
8. "As-Built" Plans and Specification Manual
9. Owner's Set of Shop Drawing Submittals

General Contractor shall submit three (3) sets of binders for Items 1-7. Documents should be bound in 3-ring binders in size suitable for amount of material included. Divider tabs should be used to separate items.

If Operating Manuals are large, they can be bound in separate binders as indicated under Paragraph I listed above.

"As-Built" Plans and Specification Manual (2 set of each) should be complete and submitted on CD's. All plans should be submitted as one set. Do not submit separate sets of "As-Built" plans for Plumbing, HVAC, Electrical, etc.

Architect shall submit one copy of the Shop Drawings to the Owner with close-out documentation.

## 2.0 - PRODUCTS (Not Applicable)

## 3.0 - EXECUTION

A. Operation and Maintenance Instructions:

Arrange for each Installer of equipment that requires maintenance to provide instruction in proper operation and maintenance. Include a detailed review of the following items.

1. Maintenance manuals.
2. Spare parts, tools, and materials.

3. Lubricants and fuels.
4. Identification systems.
5. Control sequences.
6. Hazards.
7. Warranties and bonds.
8. Maintenance agreements and similar.

B. As part of instruction for operating equipment, demonstrate the following:
1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.

C. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.
1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean. Vacuum carpeted surfaces.
4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
5. Clean the site of rubbish, litter, and foreign deposits. Rake grounds to a smooth, even textured surface.

D. Pest Control: Engage a licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

E. Removal of Protection: Remove temporary protection and facilities.

F. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

END OF SECTION

## 1.0 - GENERAL

### 1.1 RELATED DOCUMENTS

A. The General Provisions of the contract including General and Supplementary Conditions and General Requirements apply to the work specified in this section.

### 1.2 DESCRIPTION

A. This Work of this Section includes the protection and preservation from injury or defacement of all vegetation and objects designated to remain and the prevention of silts and increased run off leaving the site during or after site development.

B. The Contractor is solely responsible for controlling runoff and siltation from the site and onto protected or undisturbed areas of the site or adjacent sites. Means and methods described herein are the minimum acceptable.

C. The Work of this Section is incidental to the Contract and will not be paid for separately except where unit prices may be in effect.

D Related Sections: Divisions 2 Earthwork.

### 1.3 QUALITY ASSURANCE

A. Reference Standards:

1. General:

   a. Listings: Issues listed by references, including revisions of issuing authority, from part of this specification to extent indicated. Issues listed are identified by number, edition, date, title, or other designation established by issuing authority. Issues subsequently referred to are referred to by an issuing authority abbreviation and a basic designation.
   b. Modification: Modifications to reference standards, if any, are noted with standard.

2. Alabama Dept. of Transportation (ALDOT), Standard Specifications for Highway Construction, latest Edition: Section 665. Hay bales and Silt Fencing: Section 871, Fencing material.
3. Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas, latest Edition.
4. Local Codes, Ordinances, Regulations.

B Pre-Construction Meeting: Before proceeding with site operations, review site features to remain and be protected at the site with Owner and Architects.

C. Tree Damage:

1. If any trees to be saved are severely injured so as to cause a loss of natural character to the crown, or so as to impair the life support system

or to cause death as a result of construction operation, the Contractor agrees to pay fifty dollars ($50.00) per one inch (1") of caliper, measured four feet (4') above the ground, for trees one inch (1") in caliper and larger, as fixed and liquidated damages, as determined by the Architects..

2. Severely damaged trees requiring liquidated damages will be determined by the Architects.
3. Damaged trees which are repairable as determined by the Architect shall be repaired by a qualified tree surgeon, approved by the Architect, and whose services will be at the Contractor's expense.
4. Clean up and repair damages to Owner's satisfaction.

D. Site Damage:

1. If any protection materials or measures are dismantled, removed or altered, even temporarily, or if areas of the site designated to remain are utilized in any manner without the Architects written authorization, the Contractor agrees to pay the Owner Five Hundred Dollars ($500.00) per infraction, as determined by the Architect, as fixed and liquidated damages.

## 2.0 - PERFORMANCE REQUIREMENTS

### 2.1 PRODUCT/MATERIAL DESCRIPTION

A. Wattles and Silt Fencing:

1. In accordance with ALDOT Section 665.

2. Install at perimeter of clearing and grading operations where shown on Drawings (or as directed) as part of temporary erosion control and site protection.

## 3.0 - EXECUTION

### 3.1 JOB CONDITION

A. It is intended that the part of the property on which new construction does not occur remain undisturbed and as is.

B. Confine storage of materials, temporary facilities, and staging to areas approved by the Architect.

C. Do not carry on construction operations or materials storage within five feet (5') of tree protection fencing or flagging for Limit of Clearing.

### 3.2 SEDIMENTATION AND EROSION CONTROL

A. General: Employ erosion control management practices as required by the General Permit for Storm Water Discharges. The Contractor is responsible for obtaining any required erosion control permits for construction activity including all permit application fees. The Contractor will be responsible for application and maintenance of all conditions required by the permit. The Contractor is to be responsible for all requirements of the permit until acceptance of all work under this Contract.

B. Control and abate water pollution and erosion at its potential source; employ downstream sediment entrapment measures as a backup to primary control at the source.

C. Take all reasonable precautions to prevent and suppress fires and other detrimental occurrences which may be caused by construction operations.

D. Protect streams, lakes and reservoirs and drainage systems from contamination by siltation or other harmful materials.

E. The Contractor, his employees and subcontractors shall use conservation practices during the work, which shall include but are not limited to, the following:

1. Comply with all federal, state and local laws, rules and regulations for prevention and suppressive action for forest fires.
2. Protect and preserve soil and vegetation cover on the property and on adjacent lands. Any disturbance of soil and vegetation cover outside the Limit of Clearing line will not be permitted under any condition.
3. Prevent and control soil erosion and gulleying within the property covered by Contract and the lands immediately adjacent thereto as a result of construction.
4. Plan and conduct construction operations in such a manner so as to prevent pollution of streams, lakes and reservoirs with sediment or other harmful material used in the construction of the project. Protect downstream properties.
5. Do not deposit waste, loose soil or other materials in live streams, swales or drainage ways.
6. Do not allow fuels, oils, bitumen or other greasy or chemical substances originating from construction operations to enter or be placed where they may enter a live stream or drainageway.
7. Coordinate sedimentation and erosion control measures with the clearing and grubbing operation so that both activities occur in the correct relation to one another.
8. Install and maintain sedimentation and erosion control measures as a continuing program until the site work is complete. This includes, but is not limited to, repairs, any damage from storms, regular maintenance, and removal and disposal of accumulated silt.

F. Wattles shall be anchored by use of stakes.

G. Once installed, maintain silt fence until its capacity has been reached or erosion activity in the areas has been stabilized. When a silt fence has reached its capacity to function and need for a backup fence becomes evident, provide an additional line of silt fence. Repair of a damaged silt fence shall be accomplished by utilizing same type of materials used in original construction.

H. Install and maintain sedimentation and erosion control measures as a continuing program until the site work is complete. This includes repairs, damage from storms, regular maintenance and removal and disposal of accumulated silt.

## 3.3 MAINTENANCE

A. Maintain erosion control features that have been installed. Maintenance of erosion control features will be considered as an incidental part of the work and no specific payment for this will be made.

END OF SECTION 02125

## 1.0 - GENERAL

1.1 Scope
The work included under this section consists of furnishing all labor, material and equipment necessary to chemically treat the soil for termite control.

1.2 Applicator
The chemical shall be applied by an approved Pest Control Operator, bonded and licensed in the state in which the work is performed.

1.3 Guarantee
Upon completion of the soil treatment and as a condition for its final acceptance, the Pest Control Operator shall furnish to the Owner a written guarantee providing:

A. The Pest Control Operator will furnish the Owner with a Repair and Retreatment policy which has annual inspections included within the cost of policy at no additional cost to the Owner as outlined in Items B-E below.

B. That the chemical having at least the required concentration and the rate and method of application complies in every respect with the standards contained herein.

C. That the Pest Control Operator guarantees the effectiveness of the soil treatment against termite infestation for a period of not less than five (5) years from date of treatment.

D. Pest Control Operator will re-inspect at least once annually during protection period. Cost of Guarantee will include annual inspections for a period of five (5) years at no additional cost to Owner.

E. Evidence of re-infestation within the five (5) year guarantee period will be retreated without cost to the Owner. Any damage caused by termite infestation during the five (5) year guarantee period will be repaired or replaced by the Pest Control Operator at no additional cost to the Owner.

## 2.0 - PRODUCTS

Provide chemicals in accordance with current laws and regulations. Notify Architect of any discrepancies.

2.1 Chemicals

BASF - Termidor (Fipronil)
Taurus SC - Control Solutions (Fipronil)
Bayer Environmental Science - Premise

2.2 Mixing of Chemicals
Shall be observed on site by the Contractor's Superintendent.

## 3.0 - EXECUTION

3.1 Application

A. Slab-On Ground Construction (Minimum application)

1. Apply an over-all treatment under entire surface of floor slab including terraces and entrance platforms. Apply at rate of 1 gallon per 10 square feet, except that if fill under slab is gravel or other absorbent material, apply at rate of 1-1/2 gallons per 10 square feet.

2. Apply to critical areas along both sides of foundation wall expansion joints, around plumbing, utility services and other features that penetrate the slab at rate of 1 gallon per 2-1/2 lineal feet per foot of depth.

3. Voids of unit masonry foundation walls. Apply to voids at rate of 1 gallon per 5 lineal feet.

END OF SECTION

## 1.0 - 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.

B. Geotechnical Report by Gallet & Associates (Terracon Consultants, Inc.) , Project No.: 08BHSTC0302G. Copies can be obtained from Terracon at (205) 942-1289.

### 1.2 SUMMARY

A. This Section includes grading (excavating and filling) as indicated on drawings to required lines, dimensions, contours, and elevations for proposed improvements, and the following:

1. Removal of existing improvements in conflict with proposed improvements.
2. Stripping and stockpiling of topsoil.
3. Scarifying, moisture conditioning, densification, compaction, and testing of previously graded areas to ensure proper preparation and acceptance.
4. Excavation and embankment placement to required lines, grades, and elevations.
5. Importing of off-site borrow material suitable for structural fill as well as exporting any excess material.
6. Remove materials from grading operations that are determined unsuitable by the Geotechnical Engineer from site and dispose of off-site.
7. Preparation of areas to receive fill and preparation of excavation areas.
8. Undercutting and replacing soft, unsuitable material like "fat" clays, old fill, organic materials, etc. with compacted engineer fill obtained from an off-site source meeting the project specifications.
9. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
10. Excavating and backfilling trenches for buried utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 1 Section "Unit Prices" for a schedule of unit prices.
2. Division 1 Section "Construction Facilities and Temporary Controls."

### 1.3 UNIT PRICES

A. All excavation to be unclassified.

B. However, all stabilization and undercut & replacement will be handled with a quantity allowance with unit price being provided on the bid proposal form to be included in the base bid. The bid proposal form will have unit prices for the

undercutting of unsuitable soils and replacing with compacted structural fill. The quantity allowance breakdown is as follows:

**Unsuitable soils and replacing with compacted structural fill: 50 CY**

The unit price for "undercutting" shall include all cost associated with removing unsuitable soil from below the established subgrade elevation, off-site disposal and replacing with off-site material conforming to the project specifications and compacted to project requirement. Unsuitable material 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, and old fill. Material, which is otherwise suitable, but above the optimum moisture and requires moisture conditioning prior to use as engineered fill shall not be considered as "unsuitable". 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.

C. The measurement process for unsuitable soil amounts shall be the initial responsibility of the contractor. The basis for measurement will be based on a before and after cross section survey of the area in question performed by a licensed surveyor. No truck counts will be allowed. Measurements will be verified by the Owner's on-site Geotechnical Engineer.

1.4 DEFINITIONS

A. Backfill: Soil materials 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: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Cut line: Elevations, lines, and final cut subgrades in cut over excavated areas.

F. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

G. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations or "cut line" as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or "cut line" or beyond indicated dimensions without direction by Geotechnical engineer and Architect. Unauthorized excavation, as well as remedial

work directed by Geotechnical Engineer and Architect, shall be without additional compensation.

H. Fill: Soil materials used to raise existing grades.

I. 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.

J. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Unsuitable material:

1. Fills: Topsoil; Frozen materials; construction materials; clods of clay and stones larger than 4" (unless otherwise specified); organic material, including silts; and inorganic material including silts which are to wet to be stable, or other materials identified by the Geotechnical Engineer.
2. Existing subgrade: Same materials as listed in paragraph 1 above that are not capable of direct support of slabs, pavement and similar items with the possible exception of improvement by compaction, proof rolling, or similar methods as directed and approved by the Geotechnical Engineer.
3. Unsuitable materials identified by the geotechnical report and drawings shall be anticipated and included in the base bid. See 1.3B Unit Prices for additional information.

M. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Submit per conditions of contract and Division 1.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

1.6 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548. (To be employed by the owner).

B. Pre excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and/or the Engineer 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. Contact utility-locator service for area where Project is located before excavating.
4. Existing utilities shown on the drawings are from a combination of field locations, and utility company records. It is the Contractor's responsibility to field verify existing utilities prior to excavation.

B. Demolish and completely remove from site existing underground utilities indicated to be removed or implied to be removed by new construction and not noted to remain. Coordinate with utility companies to shut off services if lines are active.

C. Demolish and completely remove from site any buried remnant construction such as slabs, walls and foundations.

D. Contours and existing topography shown on the drawings are believed to be reasonably correct. It shall be the Contractors responsibility to determine any discrepancies which would affect his work, to make allowance for such discrepancies in the contract sum and notify the Architect in writing of such discrepancies and allowances made.

2.0 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Topsoil:

1. Materials considered useful for topsoil by the Architect shall be stockpiled at his direction at locations shown on the Drawings or as directed in the field. Topsoil shall be kept free from sub-soil, clay lumps, brush, objectionable weeds, litter, stones larger than 1/2 inches in diameter, stumps, roots, and other materials that would interfere with planting and maintenance operations.
2. All topsoil shall be stored on the site by Contractor in a location approved by the Architect. The Contractor shall use such topsoil for the purpose of fulfilling the topsoil requirements specified in this Contract. Protect stockpile by immediately compacting, dressing down and seeding with annual rye for temporary cover. Provide a silt fence around the base of topsoil pile, after completing storage, to control erosion.

3. Use topsoil stockpiles on site as necessary to complete landscape work indicated on Drawings and in accordance with specifications for landscaping.

C. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, GC, SC, SW, SP, SM, MH, ML, and CL, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soils that exhibit a liquid limit less than 50 and a plasticity index of less than 30.

D. Unsatisfactory Soils: ASTM D 2487 soil classification groups CH, OL, OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

E. Backfill and Fill: Satisfactory soil materials.

F. Subbase: At least 90 percent passing a 1-1/2 inch passing a No. 200 sieve.

G. Base: ASTM D2940; with at least 95 percent passing a 1-1/2 inch sieve and not more than 8 percent passing a No. 200 sieve.

H. 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 sieve and not more than 12 percent passing a No. 200 sieve.

I. Bedding: 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 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

J. Drainage Fill: Washed, narrowly graded mixture of 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.

K. 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 sieve and 0 to 5 percent passing a No. 4 sieve.

L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection,

detectable by metal detector when tape is buried up to 30 inches 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.

## 3.0 - 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 earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1. Erosion control is the responsibility of the Contractor. Items shown on the Drawings are considered the minimum acceptable; however, as site conditions change, additional measures may be required to control sediment.
2. The Contractor shall indemnity and hold harmless the Owner, Architect, Engineer, Owner's representatives, and their agents and employees from any claim from their work.

### 3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. 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.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

### 3.3 EXPLOSIVES

A. No explosives will be allowed.

3.4 EXCAVATION, GENERAL

A. All excavation on this project is unclassified regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

B. Material encountered in grading operation that, in the opinion of the Geotechnical Engineer or Owner, is unsuitable or undesirable shall be as follows:

1. The removal of unsuitable material will be directed by the Geotechnical Engineer or his field representative. All unsuitable material that is removed by the Contractor shall become the property of the Contractor and be disposed of off site or in a manner satisfactory to the Owner at no additional cost. All undercut shall be included in the Base Bid. See section 1.3 B. unit prices for quantity allowances.

2. Back fill for these areas will be with material approved by the Geotechnical Engineer, with layers of acceptable material compacted to the requirements set forth in these specifications.

C. Undercutting and replacement of unsuitable soils may be required to the underlying stiff soils. All undercut and replacement shall be handled in accordance with 1.3B Unit Prices above.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 feet. Extend excavations a minimum of 10' in distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Where unsuitable soils are encountered, the soils shall be completely removed to underlying stiff material per 1.3B Unit Prices above.

3.6 EXCAVATION FOR WALKS AND PAVEMENT

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades, to a distance of 8' beyond the edge of these walks and pavements.

B. Where unsuitable soils are encountered, the soils shall be completely removed to underlying stiff material per 1.3B Unit Prices above.

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 a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches on each side of pipe or conduit.

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 pipe sizes 30" and below, the "cut line" shall be 4" below the bottom of the pipe and material replaced with 4" No. 57 stone bedding unless otherwise noted.
2. For pipe sizes larger than 30", the "cut line" shall be 6" below the bottom of the pipe and material replaced with 6" no. 57 stone bedding unless otherwise noted.

## 3.8 APPROVAL OF SUBGRADE

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 with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

## 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 may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

## 3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile 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, damp-proofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing 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.

3.12 UTILITY TRENCH BACKFILL

A. 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.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with lean concrete to elevation of bottom of footings.

C. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Off-site borrow materials may be used as fill within the building and pavement areas provided that their plasticity index (PI) less than 30. Material shall have a minimum dry density of 100 pcf.

D. High plasticity (fat clays) soils should not be used as engineered fill.

E. 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.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill 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 BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Fill to extend 5' outside of the proposed building footprint.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698 (standard proctor).

1. Under structures, building slabs, steps, and pavements, scarify and re-compact top 8 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
2. Under walkways, scarify and re-compact top 8 inches below subgrade and compact each layer of backfill or fill material at 98 percent.
3. Under lawn or unpaved areas, scarify and re-compact top 8 inches below subgrade and compact each layer of backfill or fill material at 98 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from 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 Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.17 ft.
2. Walks: Plus or minus 0.10 ft.
3. Pavements: Plus or minus 0.10 ft.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 0.08 ft. when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

A. Drainage Piping: Drainage pipe is specified in Division 2 Section "Foundation Drainage Systems."

B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.

1. Compact each course of filter material to 98 percent of maximum dry density according to ASTM D 698.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.19 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. 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.

D. 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 1000 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 each 100 feet 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 each 150 feet or less of trench length, but no fewer than two tests.

E. 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 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 the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

## 1.0 - GENERAL

1.1 Scope

The work under this section consists of all finish grading, topsoil, lawns, seeding and sodding.

1.2 Extent of Lawn Area

A. The Lawn Area to receive top soil shall include the building site to the extent that will cover all unpaved areas disturbed by this construction. Blend new Lawn Area into areas of the site which are not covered under this Section.

B. Sod as indicated. Seed and straw all remaining areas disturbed by construction.

1.3 Time for Planting

When other portions of the work have progressed sufficiently the contractor may begin work for lawns and planting including the placing of topsoil. Operations shall be conducted under favorable weather conditions during the seasons which are normal for such work. Planting seasons generally shall be October 1 to March 1 for trees and plant materials, and April 1 to July 1 for planting permanent lawns.

1.4 Inspection for Acceptance

A. Inspection of the work of lawns and planting to determine the degree of completion of contract work, will be made by the architect at the conclusion of planting operations. Inspection of the work for final acceptance will be made at the end of the maintenance period.

B. After final inspection the Contractor will be notified of acceptance of all lawn and/or planting work, or if there are any deficiencies, of the requirements for completion of the work.

1.5 Guarantee and Replacement

The lawn shall be guaranteed for the duration of one full growing season after planting. The lawn shall be alive and in satisfactory growth at the end of the guarantee period.

## 2.0 - PRODUCTS

2.1 Materials

A. Fertilizer shall be 12-4-8 commercial fertilizer or equal and shall be uniform in composition, dry, and free-flowing. Fertilizer shall be delivered to the site in original unopened containers, each bearing the manufacturer's guaranteed analysis.

B. Lime shall be agricultural lime (Dolomite), or equal, containing not less than 85% of total carbonates, and shall be ground to such fineness that 50% will pass through a 100 mesh sieve and 90% will pass through a 20 mesh sieve.

C. Soil additive shall be 1/4" diameter or less pine bark mulch "Planting Mix".

D. Water used in this work shall be suitable for irrigation and free from ingredients harmful to plant life. Furnish hose and watering equipment as required.

2.2 Topsoil

Topsoil shall be a fertile, friable soil possessing physical and chemical characteristics typical of productive soils in the vicinity. Topsoil shall have an acidity range between ph 6.0 and ph 6.5 or shall be conditioned to fall within this range. Topsoil shall contain not less than 3%

organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees C. Topsoil shall be without admixture of subsoil and shall be clean and reasonably free from clay lumps, stones, stumps, roots or similar substances 2" or more in diameter, debris or other objects which might be a hindrance to planting operations or plant growth. A laboratory soils test to be provided by the contractor when requested.

2.3 Seed

A. Seed for disturbed areas not indicated for sod shall be 100% hulled Bermuda or Fescue as per plans.

B. Seed for temporary seeding shall be 100% Annual Rye Grass.

C. At the contractor's option, areas to be seeded may be sprigged with approved Bermuda grass stolons at the rate of three (3) cubic yards per 1,000 sq. ft. of lawn. Spacing shall be maximum of 8" o.c. each way in rows.

D. Seed shall meet the requirements of the Federal Seed Act. Seed mixtures shall be delivered in the original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity germination, and weed seed content.

2.4 Sod

Sod shall be Tifton 419 Bermuda grass. Each piece of sod shall have a dense stand of the specified grass and shall be strongly rooted and free of pernicious weeds. It shall be mowed to a height not to exceed 3" before lifting and shall be of uniform thickness with not over 1-1/2" nor less than 1" of soil.

## 3.0 - EXECUTION

3.1 Preparation of Subgrade

The subsoil shall be graded uniformly and lightly compacted so that it will be parallel to proposed finish grade. Stones over 2" in size, sticks and rubbish shall be removed. No heavy objects except lawn rollers shall be moved over the lawn areas after the subgrade has been prepared.

3.2 Finished Grading

After the subgrade soil has been prepared, 4" of topsoil shall be spread evenly and lightly compacted. Topsoil other than that stockpiled shall be provided under this Section. No topsoil shall be spread in a frozen or muddy condition. Commercial fertilizer and lime shall then be scarified with a tiller into the top 3" of topsoil at the rate of 10 lbs. per 1000 sq. ft.

A. Areas to be seeded shall be brought to finished grade and smoothed.

B. Areas to be sodded shall be brought to within the thickness of the sod of finish grade.

C. Areas where the topsoil has not been removed shall be scarified, smoothed, and sticks, stones and rubbish shall be removed.

3.3 Sowing of Seed

Immediately before any seed is to be sown, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable and of uniformly fine texture. Lawn areas shall be seeded evenly with a mechanical spreader at the rate of 5 lbs. of grass seed per 1000 sq. ft. of area, lightly raked and watered with a fine spray so as not to create runoff until thoroughly soaked. Fifty percent of the seed shall be sown in one direction, and the remainder at right angles to the first sowing. The method of seeding may be varied at the discretion of the contractor on his own responsibility to establish a smooth uniform turf.

3.4 Laying of Sod

Except as noted, the contractor shall lay sod in all lawn areas having a slope of 3 to 1 or steeper; a 6' diameter circle of sod around all lawn drain inlets; and where shown on the Drawings. Before any sod is laid, all soft spots and inequalities in grade shall be corrected. Sod shall be laid so that no voids occur and tamped or rolled. Topsoil shall be brushed or raked over the sodded area, rolled with 200# roller and the sod thoroughly watered.

A. Sod on slopes 3 to 1 or steeper shall be held in place by wooden pegs driven through the sod into the soil until they are flush with the top of the sod.

B. Strip or spot sod shall be placed so that the surface of the compacted sod will be slightly below the surrounding surface soil.

3.5 Temporary Seeding

Temporary seeding shall be promptly provided should the project be completed at a time when permanent grass cannot be planted. Seeding shall be seeded at the rate of 5 lbs. to 1000 sq. ft. of area. The contractor shall be responsible for erosional damage during the period of temporary planting. The specified fertilizer shall not be used for the Rye Grass planting. Prior to planting permanent lawn, the lawn bed shall be prepared as specified, and the Rye Grass growth shall be scarified in such a manner as to incorporate it into the soil. Should the temporary lawn be planted, it shall be maintained by occasional mowing and necessary repairs to all eroded areas until the beginning of the specified season for constructing permanent lawns.

3.6 Mulching of Seeded Areas

All seeded or sprigged areas having a slope of 4 to 1 or greater shall be mulched with a spray mulch of an approved latex-type material. Other areas may be mulched with wheat straw at the contractor's option. Spray mulch of a latex-type material shall be applied by hydroject method at the rate of 75 gals. of concentrate mixed in 1000 gals. of water per acre (23 gals. per 1000 sq. ft.).

3.7 Clean-Up

Any soil, mulch or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly keeping these areas clean at all times. Upon completion of the planting, all excess soil, stones and debris which has not previously been cleaned up shall be removed from the site or disposed of as directed.

3.8 Lawn Maintenance

Lawn shall be protected and maintained by watering, mowing and replanting as necessary for at least 30 days after approximately 60% germination is evident.

END OF SECTION

## 1.0 - 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.

B. All water mains shall be in strict accordance with the local water authority's requirements.

### 1.2 SUMMARY

A. This Section includes water-distribution piping and specialties outside the building for the following:

1. Water services.

B. Utility-furnished products include water meters that will be furnished to the site, ready for Installation.

### 1.3 DEFINITIONS

A. Water-Distribution Piping: Interior domestic-water piping.

B. Water Service: Exterior domestic-water piping.

C. The following are industry abbreviations for plastic materials:

1. PVC: Polyvinyl chloride plastic.

### 1.4 SUBMITTALS

A. Product Data: For the following:

1. Piping specialties.
2. Valves and accessories.
3. Water meters and accessories.
4. Backflow preventers and assemblies.
5. Protective enclosures.

B. Shop Drawings: For the following:

1. Precast concrete vaults, including frames and covers, ladders an and drains.
2. Wiring Diagrams: Power, signal and control wiring.

C. Coordination Drawings: For piping and specialties including relation to other services in same area. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field Quality-Control Test Reports: From Contractor.

E. Operation and Maintenance Data: For specialties to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 include the following:

1. Water meters.
2. Valves.
3. Backflow preventers.
4. Protective enclosures.

F. Record drawings: At project close-out of installed water service piping according to Division 1.

G. Purging and disinfecting reports.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of piping and specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions".

B. Regulatory Requirements:

1. Comply with requirements of utility company 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.

C. Piping materials shall bear label, stamp, or other markings of specified testing agency.

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. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

F. Comply with FM's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

G. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 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 piping to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. 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.

B. Perform site survey, research public utility records and verify existing utility locations. Contact utility-locating service for the area where project is located.

C. Verify that water-service piping may be installed to comply with original design and reference standards.

D. Site information: Reports on subsurface condition investigations made during design of project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions between soil borings. Owner assumes no responsibility for interpretations or conclusions drawn from this information.

1.8. COORDINATION

A. Coordinate connection to water main with utility company.

B. Coordinate piping materials, sizes, entry locations and pressure requirements with building distribution & fire protection piping.

C. Coordinate with other utility work.

D. Coordinate electrical wiring for tamper switches, vault heaters, and sump pumps.

2.0 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

2.3 PVC PIPE AND FITTINGS

A. PVC, Schedule 40 Pipe: ASTM D 1785.

1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.

B. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket and spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Gaskets: AWWA C111, rubber.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 JOINING MATERIALS

A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

B. Transition Couplings:

1. Underground Piping, NPS 1-1/2 and Smaller: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
2. Underground Piping, NPS 2 and Larger: AWWA C219, metal, sleeve-type coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
3. Aboveground or Vault Piping: Pipe fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 PIPING SPECIALTIES

A. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

B. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.

1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig minimum working pressure to suit system pressures.
3. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

    a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.

4. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F.
5. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig minimum working pressure at 225 deg F.

2.6 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Nonrising-Stem, Metal-Seated Gate Valves: AWWA C500, gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

a. Minimum Working Pressure: 200 psig.
b. End Connections: Mechanical joint.
c. Interior Coating: Complying with AWWA C550.

2.7 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies: Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine.

1. 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.

2. Valve: AWWA, cast-iron, nonrising-stem, metal or resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over valve, and approximately 5-inch- diameter barrel.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FM-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.

D Indicator Posts: UL 789, FM-approved, horizontal, wall-type, cast-iron body with operating wrench, extension rod, and cast-iron barrel.

2.8 CHECK VALVES

A. AWWA Check Valves:

1. Check Valves: AWWA C508, swing-check type with 175-psig working-pressure rating and resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

B. UL-Labeled Check Valves:

1. Check Valves: UL 312, swing-check type with 250-psig working-pressure rating, rubber-faced checks unless otherwise indicated, and ends matching piping.

2.9 DETECTOR CHECK VALVES

A. Detector Check Valves: UL 312, galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends; designed for 175-psig working pressure. 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.

1. 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.

B. Detector Check Valves: UL 312, FM-approved detector check, iron body, corrosion-resistant clapper ring and seat ring material, 175-psig working pressure, flanged ends, with connections for bypass and installation of water meter.

2.10 WATER METERS

A. Water meters will be furnished by the Contractor and shall be per the local water authority's requirements.

2.11 WATER-METER BOXES

A. Description: Cast-iron body and cover for disc-type water meter with lettering "WATER METER" in cover; and slotted, open-bottom base section of length to fit over service piping.

1. Option: Base section may be cast-iron, PVC, clay, or other pipe.

B. Description: Cast-iron body and double cover for disc-type water meter with lettering "WATER METER" in top cover; separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.

C. Description: Polymer-concrete body and cover for disc-type water meter with lettering "WATER" in cover; and slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb minimum over 10 by 10 inches square.

2.12 HOSE-CONNECTION, BACKFLOW-PREVENTION DEVICES

A. General: ASSE standard, nonremovable-type, backflow-prevention devices with ASME B1.20.7, garden-hose threads on outlet.

B. Hose-Connection Vacuum Breakers: ASSE 1011, nickel plated, with manual drain feature. Units attached to rough-bronze-finish hose connections may be rough bronze.

C. Hose-Connection Backflow Preventers: ASSE 1052, suitable for at least 3m flow and applications with up to 10-foot head of water back pressure. Include two check valves and intermediate atmospheric vent.

2.13 BACKFLOW PREVENTERS

A. General: ASSE standard, backflow preventers.

1. Working Pressure: 150 psig minimum, unless otherwise indicated.
2. NPS 2 and Smaller: Bronze body with threaded ends.
3. NPS 2-1/2 and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.

    a. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

4. Interior Components: Corrosion-resistant materials.
5. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.
6. Strainer: On inlet, if indicated.

B. Pipe-Applied, Atmospheric-Type Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.

C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013 or AWWA C511, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME A112.1.2, air-gap fitting located between two positive-seating check valves.

1. Maximum Pressure Loss: 12 psig through middle 1/3 of flow range.

D. Double-Check-Valve Backflow Prevention Assemblies: ASSE 1015 or AWWA C510, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valves.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

E. Double-Check-Valve Backflow Prevention Assemblies: UL 312, FM approved; with two UL 312, FM-approved, iron-body, 175-psig working-pressure, flanged-end check valves and two UL 262, FM-approved, iron-body, outside screw and yoke, flanged, 175-psig working-pressure gate valves.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

F. Double-Check-Detector Assembly Backflow Preventers: ASSE 1048, FM approved or UL listed, and suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet. Include test cocks; two positive-seating check valves; and bypass with displacement-type water meter, valves, and double-check backflow preventer.

1. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

## 2.14 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.

B. Ladder: ASTM A 36, steel or polyethylene-encased steel steps.

C. Manhole: ASTM A 48, Class No. 35 minimum tensile strength, gray-iron traffic frame and cover.

1. Dimensions: Not smaller than 24-inch diameter, unless otherwise indicated.

D. Drain: ASME A112.21.1M, 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.

2.15 PROTECTIVE ENCLOSURES

A. Protective Enclosures, General: ASSE 1060, outdoor weather-resistant enclosure designed to protect aboveground water piping equipment or specialties from vandalism. Include size and dimensions indicated but not less than those required for access and service of protected unit.

B. Freeze-Protection Enclosures: Insulated and with heat source to maintain minimum internal temperature of 40 deg F when external temperatures reach as low as minus 34 deg F.

1. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
2. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

a. Housing: Reinforced-aluminum or fiberglass construction.

1) Drain opening for units with drain connection.
2) Access doors with locking devices.
3) Insulation inside housing.
4) Anchoring devices for attaching housing to concrete base.

b. Electric heating cable or heater with self-limiting temperature control.

C. Precast concrete base of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

2.16 FIRE HYDRANTS

A. All fire hydrants shall be in accordance with the specifications and standards of the local fire department and the local water authority.

3.0 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 2 Section "Earthwork" 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 in applications below, unless otherwise indicated.

C. Do not use flanges, unions, or keyed couplings for underground piping.

D. Flanges, unions, keyed couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground Water-Service Piping: Use any of the following piping materials for each size range:

1. NPS 3/4 to NPS 3-1/2: PVC, Schedule 40 pipe and fittings
2. NPS 4 to NPS 8: Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed or joints or PVC, C900, Class 200 pipe and fittings.

## 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/FM, 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. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, high-pressure, resilient seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM, cast-iron, nonrising-stem gate valves with indicator post.
3. Use the following for valves in vaults and aboveground:

    a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising-stem.
    b. Gate Valves, NPS 3 and Larger: UL/FM, cast iron, OS&Y rising stem.
    c. Check Valves: AWWA C508, swing-check valves.

4. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

## 3.4 JOINT CONSTRUCTION

A. See Division 2 Section "Utility Materials" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
2. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
3. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with keyed couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.

4. Copper Tubing Soldered Joints: ASTM B 828. Use flushable flux and lead-free solder.
5. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
6. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. 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.

C. 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.

D. 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.

E. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

F. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 36 inches cover over top.
2. Under Railroad Tracks: With at least 48 inches cover over top.
3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

G. 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.

H. 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.

I. Anchor service-entry piping to building wall.

J. See Division 15 Section "Domestic Water Piping" for potable-water piping inside the building.

3.6 ANCHORAGE INSTALLATION

A. 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.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Fire-Service-Main Piping: According to NFPA 24.

B. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 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. UL/FM Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

C. Detector Check Valves: Install in vault or aboveground.

3.8 DETECTOR CHECK VALVE INSTALLATION

A. Install detector check valves for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

B. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

3.9 WATER-METER INSTALLATION

A. Install water meters, piping, and specialties according to utility company's written requirements.

B. Water Meters: Install compound-type water meters, NPS 3 and larger, in meter vaults. Include shutoff valves on water-meter inlets and outlets and valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.

3.10 ROUGHING-IN FOR WATER METERS

A. Rough-in piping and specialties for water-meter installation according to utility company's written instructions and requirements.

3.11 BACKFLOW-PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.12 VAULT INSTALLATION

A. See Division 3 Section "Cast-in-Place Concrete" for concrete vaults.

B. Install precast concrete vaults according to ASTM C 891.

C. Connect drain outlet to storm drainage piping. Refer to Division 2 Section "Storm Drainage."

3.13 PROTECTIVE ENCLOSURE INSTALLATION

A. Install concrete base level and with top approximately 2 inches above grade.

B. Install protective enclosure over valves and equipment.

C. Anchor protective enclosure to concrete base.

3.14 CONNECTIONS

A. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping and specialties.

B. See Division 2 Section "Utility Materials" for piping connections to valves and equipment.

C. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

D. Connect water-distribution piping to post hydrants and drinking fountains.

E. Connect water-distribution piping to interior domestic-water and fire-suppression piping.

F. Connect waste piping from drinking fountains to sanitary sewerage system. See Division 2 Section "Sanitary Sewerage" for connection to sanitary sewer.

G. Ground equipment according to Division 16 Section "Grounding and Bonding."

H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.15 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.16 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping. See Division 2 Section "Earthwork" for underground warning tapes.

B. Permanently attach equipment nameplate or marker, indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section "Utility Materials" for identifying devices.

3.17 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or as described below:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 02510

## 1.0 - 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. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving overlay.
4. Asphalt surface treatments.
5. Pavement-marking paint.
6. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for aggregate base courses.

### 1.3 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. DOT: Department of Transportation.

### 1.4 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT. Retain first subparagraph below if standard specifications are indicated on Drawings.

1. Standard Specification: Alabama Department of Transportation (ALDOT) "Standard specifications for highway construction" latest edition.
2. Measurement and payment provisions and safety program submittals included in the standard specifications do not apply to this Section.

### 1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: For each job mix proposed for the Work.

C. Material Test Reports: For each paving material.

D. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

C. Regulatory Requirements: Comply with "Standard Specifications for Highway Construction" latest edition of ALDOT for asphalt paving work.

D. Asphalt-Paving Publication: Comply with Al MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of subgrade and preparatory work.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-

based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

## 2.0 - PRODUCTS

### 2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: Course aggregate shall comply with ALDOT Section 801.

C. Fine Aggregate: Fine aggregate shall comply with ALDOT Section 802.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: Mineral filter shall comply with ALDOT Section 805.

### 2.2 ASPHALT MATERIALS

A. Base course: Place to width and depth shown and comply with ALDOT Section 825, Type B.

B Asphalt Binder: Bituminous concrete binder layer to width and depth shown on the drawings in accordance with ALDOT Section 424B.

C Prime Coat: Shall be in accordance with ALDOT Section 401.

D Tack Coat: Shall be in accordance with ALDOT Section 405.

E Surface Course: Shall be in accordance with ALDOT Section 424A.

F Water: Potable.

### 2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wet-able powder form.

B. Sand: ASTM D 1073, Grade Nos. 2 or 3.

C. Joint Sealant: ASTM D 3405, hot-applied, single-component, polymer-modified bituminous sealant.

D. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

1. Color: As indicated on the drawings.

### 2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes meeting the requirements of the applicable sections of the ALDOT "Standard Specifications for Highway Construction" and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: ALDOT 825, Type B.
3. Binder Course ALDOT 424B.
4. Surface Course: ALDOT 424A.

## 3.0 - EXECUTION

### 3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Verify that subgrade elevation is as indicated on the drawings.

C. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

D. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 1-1/2 inches.
2. Mill to a uniform finished surface free of gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

### 3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of.

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.3 to 0.50 gal./sq. yd. Apply in accordance with ALDOT Section 401.03 (d) 4. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 15 days before starting first coat of pavement marking. Second coat shall be placed 30 – 60 days after the first coat.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply 2 coats of paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils per coat.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.12 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 02741

## 1.0 – 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 exterior cement concrete for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.
5. Site walls and footings.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for subgrade preparation, grading, and subbase course.

### 1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

### 1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

D. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or adhesive.
8. Joint fillers.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work 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. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixes.
c. Ready-mix concrete producer.
d. Concrete subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required other construction activities.

2.0 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

C. Epoxy-Coated Welded Wire Fabric: ASTM A 884, Class A, plain steel.

D. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

E. Epoxy-Coated Reinforcement Bars: ASTM A 775; with ASTM A 615, Grade 60, deformed bars.

F. Steel Bar Mats: ASTM A 184; with ASTM A 615, Grade 60, deformed bars; assembled with clips.

G. Plain Steel Wire: ASTM A 82, as drawn.

H. Epoxy-Coated Wire: ASTM A 884, Class A coated, plain steel.

I. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

J. Epoxy-Coated Joint Dowel Bars: ASTM A 775; with ASTM A 615, Grade 60, plain steel bars.

K. Tie Bars: ASTM A 615, Grade 60, deformed.

L. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports.

N. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 618, Class F or C. Use one brand of cement throughout project unless otherwise accepted.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.

D. Blended Hydraulic Cement: ASTM C 595M, Type IP portland pozzolan cement.

E. Blended Hydraulic Cement: ASTM C 595M, Type I (PM) pozzolan-modified portland cement.

F. Blended Hydraulic Cement: ASTM C 595M, Type I (SM) slag-modified portland cement.

G. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

1. Class: 4S.
2. Class: 4M.
3. Class: 1N.
4. Maximum Aggregate Size: 1-1/2 inches nominal.
5. Maximum Aggregate Size: 1 inch nominal.
6. Maximum Aggregate Size: 3/4 inch nominal.
7. Do not use fine or coarse aggregates containing substances that cause spalling.

H. Water: ASTM C 94.

2.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing Non-Chloride Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

1. Color: As selected by Architect from manufacturer's full range.

C. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.

1. Color: As indicated.

D. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

E. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

F. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.

2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

H. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

I. Colored Dry-Shake Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, nonfading mineral oxides interground with cement.

1. Color: As selected by Architect from manufacturer's full range.

## 2.7 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 ACI 301 and ACI 318-89, Section 5.3, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

1. Do not use Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi for site walls and footings.
2. Compressive Strength (28 Days): 3000 psi unless noted.
3. Maximum Water-Cementitious Materials Ratio: 0.50 for site walls.
4. Maximum Water-Cementitious Materials Ratio: 0.53 unless noted.
5. Slump Limit: 3-5 inches.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:

1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
2. Air Content: 6.0 percent for 1-inch maximum aggregate.
3. Air Content: 6.0 percent for ¾-inch maximum aggregate.

F. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.

G. Coloring Agent: Add coloring agent to mix according to manufacturer's written instructions.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

3.0 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
3. Provide tie bars at sides of pavement strips where indicated.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. 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.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

a. Radius: 1/4 inch.

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 developing random contraction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4 inch.

## 3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. 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 air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

N. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. 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. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

## 3.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

## 3.7 CONCRETE PROTECTION 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 follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

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 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, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
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.

## 3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Contraction Joint Depth: Plus 1/4 inch, no minus.
9. Joint Width: Plus 1/8 inch, no minus.

## 3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete pavement to cure for 30 days and be dry before starting first coat of pavement marking. Second coat shall be placed 30 – 60 days after the first.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply 2 coats of paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils per coat.

## 3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
8. When total quantity of a given class of concrete is less than 50 cu. yd. Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 02751

## 1.0 - GENERAL

1.1 Scope
The work of this section shall include all labor, material and equipment necessary to furnish and install Fences, Gates and accessories hereafter specified and/or designated on the drawings.

1.2 Manufacturer
Fence and Gate Assembly shall be Anchor, Cyclone, Allied or approved equal.

1.3 Substitutions
Fence and Gates of other manufacturers may be substituted, provided that in the architect's opinion, the Fence and Gates are equal to that specified, and approval is obtained not less than seven (7) days prior to date set for opening bids.

1.4 Shop Drawings
Shop drawings will be submitted to the Architect for approval before fabrication. These drawings to show: size, arrangement and type of material, connections and relationship to adjacent work.

1.5 Guarantee
The Fence and Gate Contractor shall guarantee all materials and workmanship covered by this section for a period of one (l) year from Date of Acceptance, normal wear and tear excepted.

1.6 Finish
Match Existing Finish

## 2.0 - PRODUCTS

2.1 Materials

A. Mesh: 2" weave, composed of No. 9 wire of 1,200 lb. minimum breaking strength. Heavy zinc coat after weaving by hot dip smelter process. Mesh to be height as shown.

B. Corner terminal and gate posts: 2-1/2" sq. tubing of 5.70 lb. per ft. or 2-7/8" round tubing of 5.79 lb. per ft. galvanized steel.

C. Line posts: 2-1/4" sq. H-beam of 4.1 lbs. per foot or 2-3/8" round tubing of 3.65 lbs. per ft., galvanized steel.

D. Top rail: 1-5/8" diameter o.d. galvanized steel, 18'-0" minimum length with 6" long couplings.

E. Middle rail: None required.

F. Truss Braces: 1-5/8" o.d., galvanized steel at mid height of fence with 3/8" truss rod and turnbuckle attachment. Install between each gate post and adjacent line post. Install two at each corner post (one on each side.)

G. Bottom Wires: At bottom of all fence furnish No. 7 gauge coil spring bottom tension wire.

H. Gates: Sizes as shown with frame made up of either 1-1/2" square tubing (min. weight 1.90 lbs. per ft.) or 1-5/8" o.d. round tubing (min. weight 1.806 lbs. per ft.). Join corners at corners by welding to form a rigid panel. Fill with same mesh as used on fence, attached on all four sides with adjustable hook bolts and tension rods. Provide fulcrum latch with provision for padlocking. On double gates provide lift rod and securely anchored keeper.

## 3.0 - EXECUTION

### 3.1 Installation

Install corner and gate posts into 12" diameter x 40" deep hole filled with concrete. Install line posts on 10'-0" maximum centers into 10" diameter x 32" deep holes filled with concrete. Attach top rail, truss braces and gates to posts with standard malleable fittings. Install mesh with stretcher bars and top wire clips.

### 3.2 Clean Up

A. The contractor shall promptly remove from the site all excess excavated materials and other debris resulting from fence construction.

B. Construction fencing shall be removed from job site prior to final inspection.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

B. Concrete paving and walks are specified in Division 2.

1.3 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on one reproducible print and two copies only. The reproducible print will be returned. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.

C. Shop drawings for reinforcement, prepared for fabrication, bending, and placement of concrete reinforcement. Comply with ACI S-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Samples: Submit samples of materials as requested by Architect, including names, sources, and descriptions.

E. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test.

F. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by the manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 301 "Specifications for Structural Concrete for Buildings".

2. ACI 302 "Guide for Concrete Floor and Slab Construction".

3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing

Concrete".

4. ACI 305 "Hot Weather Concreting".

5. ACI 306 "Cold Weather Concreting".

6. ACI 309 "Guide for Consolidation of Concrete"

7. ACI 311 "Recommended Practice for Concrete Inspection".

8. ACI 318, "Building Code Requirements for Reinforced Concrete."

9. ACI 347 "Recommended Practice for Concrete Formwork".

10. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."

11. American Welding Society, AWS D1.4 "Structural Welding Code- Reinforcing Steel".

B. Concrete Testing Service: Employ, at Contractor's expense a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.

C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.

B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

D. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

E. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.

1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Reinforcement: ASTM A 185, welded steel wire reinforcement.

D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

3. For sand blasted or intentionally roughened concrete surfaces provide supports of stainless steel (CRSI, Class 2).

E. Threaded Dowels: Continuous threaded high-strength steel bars equal to "Lasstud" by Richmond Screw Anchor Co., Inc. Provide inserts compatible with dowels, designed for ultimate pull-out force indicated on the drawings.

F. Steel Shapes, Plates and Rods: Conform to ASTM A 36 "Specification for Structural Steel".

G. Do not weld reinforcing steel unless specifically noted on drawings. If welding is shown, conform to latest revision of AWS D12.1, "Reinforcing Steel Welding Code of the American Welding Society". Perform all welding with certified welders qualified per AWS.

2.3 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout project unless otherwise acceptable to Architect.

B. Fly Ash: ASTM C 618, Type C or Type F.

1. Limit use of fly ash to not exceed 25 percent of cement content by weight.

C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious sub- stances.

2. Local aggregates not complying with ASTM C 33 but that special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Architect.

D. Water: Drinkable.

E. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Water-Reducing Admixture: ASTM C 494, Type A.

H. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G.

I. Water-Reducing, Non-Chloride Accelerating Admixture: ASTM C 494, Type E.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

2.4 RELATED MATERIALS:

A. Available Products and/or Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to those listed.

B. Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

C. Vapor Retarder: Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:

1. Polyethylene sheet not less than 8 mils thick.

D. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as abrasive aggregate for nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, and nonglazing and is unaffected by freezing, moisture, and cleaning materials.

E. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

F. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

G. Liquid Membrane-Forming Curing Compound: Liquid-type membrane- forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.

1. Contractor to verify that product is compatible with other applied finishes.

H. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.

I. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.

J. Bonding Compound: Polyvinyl acetate or acrylic base.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

a. Polyvinyl Acetate (Interior Only):

1) "Superior Concrete Bonder," Dayton Superior Corp.

2) "Euco Weld," Euclid Chemical Co.
3) "Weld-Crete," Larsen Products Corp.
4) "Everweld," L&M Construction Chemicals, Inc.

b. Acrylic or Styrene Butadiene:

1) "Acrylic Bondcrete," The Burke Co.
2) "Strongbond," Conspec Marketing and Mfg. Co.
3) "Day-Chem Ad Bond," Dayton Superior Corp.
4) "SBR Latex," Euclid Chemical Co.
5) "Daraweld C," W.R. Grace & Co.
6) "Hornweld," A.C. Horn, Inc.
7) "Everbond," L & M Construction Chemicals, Inc.
8) "Acryl-Set," Master Builders Inc.
9) "Intralok," W.R. Meadows, Inc.
10)"Sonocrete," Sonneborn-Rexnord.
11)"Stonlock LB2," Stonhard, Inc.

K. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

2.5 PROPORTIONING AND DESIGN OF MIXES:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixtures or field experience methods as specified in ACI 318-95 Section 5.3. If trial mixtures method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing, unless otherwise acceptable to Architect.

B. Trial mix designs and strength tests, made by qualified independent material laboratory, in accordance with ACI 318-95 Section 5.3 are required for all concrete designs for which a suitable experience record is not available.

C. Mix design based on a record of past performance in accordance with ACI 318-95 Section 5.3, may be provided by qualified concrete supplier or precast concrete manufacturer for concrete designs. Mix design shall be certified by an independent testing laboratory.

D. All concrete mix designs shall include the following information:

1. Proportions of cement, fine and coarse aggregate and water.

2. Water/cement ratio, design strength, slump and air content.

3. Type of cement and aggregates.

4. Type and dosage of all admixtures.

5. Type, color and dosage of integral coloring compounds, where applicable.

6. Special requirements for pumping.

7. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.

E. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have

been reviewed by Architect.

F. Design mixes to provide normal weight concrete as indicated on drawings and schedules.

G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

2.6 ADMIXTURES:

A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.

1. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).

C. Use air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having the total air content as shown on the drawings.

D. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

E. Water-Cement Ratio: Provide concrete with the maximum water-cement (w/c) ratios as shown on the drawings.

F. Slump Limits: Proportion and design mixes to result in slump at point of placement as shown on the drawings.

2.7 CONCRETE MIXING:

A. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.

1. Addition of water to batch for material with insufficient slump will be permitted in accordance with ACI 301.

2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

C. High range water reducing admixture (superplasticizer) redosage may be permitted when prior approval, as to methods and procedures, is obtained from the Architect.

PART 3 - EXECUTION

3.1 GENERAL:

A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS:

A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 301 Table 4.3.1.

B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER INSTALLATION:

A. General: Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.

B. Lap joints 6 inches and seal vapor retarder joints with manufacturers' recommended mastic and pressure-sensitive tape.

C. After placement of vapor retarder, cover with sand cushion and compact to depth as shown on drawings.

3.4 PLACING REINFORCEMENT:

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.

1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS:

A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls, slabs, beams and between walls and footings.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

1. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.

F. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth or approved inserts, unless otherwise indicated. Make saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregates.

1. With prior approval from Architect contraction joints may be formed by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

2. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

3. Joint sealant material is specified in Division 7 Sections of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS:

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARATION OF FORM SURFACES:

A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

B. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against

which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.8 CONCRETE PLACEMENT:

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.

B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.

C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement.

E. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

F. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

2. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

G. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in

concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.

4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

3.9 FINISH OF FORMED SURFACES:

A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

3.10 MONOLITHIC SLAB FINISHES:

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

1. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (Fl) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat

surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects that would telegraph through applied floor covering system.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

F. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.

1. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.

2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

G. Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surface indicated.

1. Apply dry shake materials for colored wear-resistant finish at rate of 100 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.

2. Cast a trial slab approximately 10 feet square to determine actual application rate, color, and finish, as acceptable to Architect.

3. Immediately following first floating operation, uniformly distribute with mechanical spreader approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material

with overlapping applications to ensure uniform color, and embed by power floating.

4. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer. Apply curing compound immediately after final finishing.

3.11 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

C. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

D. Provide moisture curing by following methods.

1. Keep concrete surface continuously wet by covering with water.

2. Use continuous water-fog spray.

3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.

E. Provide moisture-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:

1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete. Architect to approve use where application of liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials are to be applied.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.

I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

J. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

3.12 REMOVAL OF FORMS:

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.13 REUSE OF FORMS:

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid

offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and 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 to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

3.15 CONCRETE SURFACE REPAIRS:

A. General: No surface shall be patched or repaired until the Architect has reviewed the defective condition and approved the Contractor's submitted repair and/or patching materials and procedures.

B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

D. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.

1. Repair finished unformed surfaces that contain defects that affect durability of concrete.

Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and

other objectionable conditions.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, when acceptable to Architect by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method when acceptable to Architect. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

F. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 END OF SECTION 03300.

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 structural precast concrete units, including the following:

1. Hollow-core slab units.

B. Related Sections: The following sections contain requirements that relate to this Section.

C. Cast-in-place concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Joint sealants and backing are specified in Division 7 Section "Joint Sealants."

E. Applied finishes are specified in Division 9 Sections.

1.3 SUBMITTALS:

A General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data and instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.

C. Mix design reports of proposed concrete mix as specified in Part 2 of this Section.

D. Shop drawings prepared by or under the supervision of a qualified professional engineer, showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-section; location, size, and type of reinforcement, including special reinforcement; and lifting devices necessary for handling and erection.

1. Indicate layout and dimensions, and identify each precast concrete unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.

2. Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates, if required, for accurate placement.

E. Samples of bearing pads.

F. Test reports as required by provisions of this Section.

1.4 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

1. ACI 301, "Specifications for Structural Concrete for Buildings."

2. ACI 318, "Building Code Requirements for Reinforced Concrete."

3. AWS D1.1, "Structural Welding Code: Steel."

4. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

5. Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products."

B. Fabricator Qualifications: Firm experienced in fabrication of precast concrete units similar to units required for this Project and that have a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in work.

1. Fabricator must be a producer member of the Prestressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.

C. Design by Fabricator: Design precast slab units to support superimposed dead loads including the weight of masonry partition walls, and live loads as indicated on drawings and as required for compliance with local governing code requirements.

D. Fabrication Qualifications: Produce precast concrete units at fabricating plant engaged primarily in manufacturing of similar units, unless plant fabrication or delivery to Project site is impractical.

1. If units are not produced at precast concrete fabricating plant, maintain procedures and conditions for quality control that are equivalent to plant production.

E. Fire-Resistance Rated Precast Units: Where precast concrete units are shown or scheduled as requiring fire-resistance classification, provide units tested and listed by Underwriters Laboratories, Inc. (UL) in "Fire Resistance Directory", or with each unit bearing UL label and marking.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver the amount of precast concrete units needed in a timely manner to the Project site to ensure installation continuity.

B. Store and handle the units at the Project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.

C. Deliver anchorage items that are to be embedded in other construction before starting such work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 FORMWORK:

A. Provide forms and, where required, form facing materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish

surfaces.

B. Accurately construct forms, mortar-tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and for prestressed, pre-tensioning, and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL 116.

1. Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or movement during detensioning.

C. Provide finish as directed by architects drawings for all exposed to view precast concrete beams and lintels. At a minimum the finish shall be rubbed smooth free of any pin holes and or honeycomb surfaces. Surface shall be of uniform color, texture and appearance. Provide all revels in formwork as necessary to reproduce the visual lines shown on the architectural drawings. Do not attempt to tool or install reveals after beams have been cast.

2.2 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Reinforcement: ASTM A185.

D. Welded Deformed Steel Wire reinforcement: ASTM A 497.

E. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.

1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected with plastic (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 PRESTRESSING TENDONS:

A. Uncoated, 7-wire, stress-relieved strand complying with ASTM A 416. Use Grade 250 unless Grade 270 is indicated.

1. A strand similar to above, but having the size and ultimate strength of wires increased so that the ultimate strength of the strand is increased approximately 15 percent, or a strand with increased strength but fewer number of wires per strand, may be used at manufacturer's option.

2.4 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I or Type III.

B. Aggregates: ASTM C 33, and as specified here. Provide aggregates from a single source for exposed concrete.

1. Local aggregates not complying with ASTM C 33, but that have shown by special test or actual service to produce concrete of adequate strength and durability, may

be used when acceptable to Architect.

C. Lightweight Aggregate: ASTM C 330.

D. Water: Potable.

E. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.

F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

G. Water-Reducing Admixture: ASTM C 494, Type A, or other Type approved for fabricator's units.

2.5 CONNECTION MATERIALS:

A. Steel Plates: Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.

B. Steel Shapes: ASTM A 36.

C. Anchor Bolts: ASTM A 307, low-carbon steel bolts, regular hexagon nuts, and carbon steel washers.

D. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, and hardened washers complying with ASTM A 325.

E. Finish of Steel Units: Exposed units galvanized per ASTM A 153; others painted with rust-inhibitive primer.

F. Bearing Pads: Provide bearing pads for precast concrete units as indicated on drawings.

1. Random oriented fiber reinforced material capable of supporting a compressive stress of 3000 psi with no cracking splitting or delamination.

G. Welding Electrodes: Comply with AWS standards.

H. Accessories: Provide clips, hangers, and other accessories required to install project units and to support subsequent construction or finishes.

2.6 GROUT MATERIALS:

A. Cement Grout: Portland cement, ASTM C 150 (Type I), and clean, natural sand, ASTM C 404. Mix at ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

B. Metallic Shrinkage-Resistant Grout: Premixed, factory-packaged ferrous aggregate grouting compound complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.

C. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.

D. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:

1. Metallic Shrinkage-Resistant Grout:

a. 100 Non-Shrink Grout (Metallic), Conspec, Inc.
b. Firmix, Euclid Chemical Co.
c. Vibra-Foil, W.R. Grace.
d. Ferrogrout, L & M Construction Chemicals, Inc.
e. Embeco 885, Master Builders.
f. Portalico, Protex Industries, Inc.
g. Kemox G, Sika Chemical.
h. Ferrolith G, Sonneborn/Rexnord.

2. Nonmetallic Shrinkage-Resistant Grout:

a. 100 Non-Shrink Grout (Non-Metallic), Conspec, Inc.
b. Supreme Grout, Cormix, Inc.
c. Sure Grip Grout, Dayton Superior.
d. Euco N.S., Euclid Chemical Co.
e. Crystex, L & M Construction Chemicals.
f. Masterflow 928, Master Builders, inc.
g. Sealtight 588 Grout, W.R. Meadows.
h. Propak, Protex Industries, Inc.
i. Set Non-Shrink, Set Products, Inc.
j. Stoncrete NM1, Stonhard, Inc.
k. Multi-Purpose Grout, Symons Corp.
l. Portland Expanding Grout (Non-Shrink), Target Products, Ltd.
m. Five Star Grout, U.S. Grout Corp.

2.7 MIX PROPORTION AND DESIGN:

A. Prepare design mixes for each type of concrete required.

B. Design mixes may be prepared by independent testing facility or by qualified precast manufacturing plant personnel at precast fabricator's option.

C. Proportion mixes by either laboratory trial batch or field experience methods using materials to be employed on the Project for each type of concrete required complying with ACI 318.

1. Produce standard-weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

a. Compressive strength -- 5000 psi minimum at 28 days.

b. Release strength for prestressed units -- 3500 psi.

2. Produce lightweight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:

a. Compressive strength -- 5000 psi minimum at 28 days.

b. Air-dry density -- not less than 90 nor more than 115 lb per cu. ft.

c. Release strength for prestressed units -- 3500 psi.

3. Cure compression test cylinders using same methods as for precast concrete work.

D. Submit written reports to Architect of proposed mix for each type of concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed by Architect.

E. Adjusting Concrete Mixes: Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test date for revised mix designs and strength results must be submitted to and accepted by Architect before using in the Work.

F. Admixtures: Use air-entraining admixture in concrete, unless otherwise indicated.

1. Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Architect's acceptance.

2. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.8 FABRICATION:

A. General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116 and as specified for types of units required.

B. Job-Site Casting: Use ready-mix concrete for units produced at a location other than the precast concrete fabricating plant complying with ASTM C 94.

C. Ready-Mixed Concrete: Comply with requirements of ASTM C 94 and as specified here.

1. Delete references for allowing additional water to be added to the batch for material with insufficient slump. Adding water to the batch is not permitted.

D. A shorter mixing time than that specified in ASTM C 94 may be required during hot weather or under conditions contributing to rapidly setting concrete.

1. When the air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

E. Built-in Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect the position of the main reinforcement or placing of concrete. Do not relocate bearing plates in units unless acceptable to Architect.

F. Cast-in openings larger than 10 inches in diameter or 10 inches square in accordance with final shop drawings. Other smaller holes may be field cut by trades requiring them, as acceptable to Architect.

G. Coat surfaces of forms with bond-breaking compound before reinforcement is placed.

Provide commercial formula form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces, and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.

H. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.

I. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required.

J. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

K. Pre-tension tendons for prestressed concrete either by single-strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.

L. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items.

M. Identify pick-up points and orientation in structure with permanent markings, complying with markings indicated on final shop drawings. Imprint casting date on each precast unit on a surface that will not show in the finished structure.

N. Cure by low-pressure steam, steam vapor, radiant heat and moisture, or another similar process to accelerate concrete hardening and to reduce curing time.

O. Delay detensioning prestressed concrete units until concrete has attained at least 70 percent of the design stress, as established by test cylinders.

1. If concrete has been heat-cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.

2. Detension pre-tensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.

P. Finish formed surfaces of precast concrete as indicated for each type of unit, and as follows:

1. Standard Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations, and form joint marks, and minor chips and spalls will be tolerated. Major or unsightly imperfections, honeycombs, or structural defects are not permitted.

2. Commercial Finish: Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces are to be true, well-defined surfaces.

3. Architecturally Exposed Finish: Provide finish as directed by architects drawings for all exposed to view precast concrete beams and lintels. At a minimum the finish shall be rubbed smooth free of any pin holes and or honeycomb surfaces. Surface

shall be of uniform color, texture and appearance. Provide all revels in formwork as necessary to reproduce the visual lines shown on the architectural drawings. Do not attempt to tool or install reveals after beams have been cast unless approved by the architect.

Q. Finish unformed surfaces by trowel unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

1. Apply scratch finish to precast concrete units that will receive concrete topping after installation. Following initial strikeoff, transversely scarify surface to provide ridges approximately 1/4 inch deep.

2.9 HOLLOW CORE SLAB UNITS:

A. Type: Precast, prestressed concrete units with open voids running full length of slabs.

B. Furnish units that are free of voids or honeycomb, with straight true edges and surfaces.

C. Provide standard finish units unless otherwise indicated.

D. Fabricate units of concrete materials that will provide a minimum 3500 psi compressive strength at the time of initial prestress and a 28-day compressive strength of 5000 psi.

E. Adequately reinforce slab units to resist transportation and handling stresses.

F. Include cast-in weld plates where required for anchorage or lateral bracing to structural steel members.

G. Coordinate with other trades for installation of items to be cast-in hollow slab units.

H. Provide solid, monolithic, precast slab units indicated to be an integral part of the hollow slab unit system. Design and fabricate solid units to dimensions and details indicated as specified for hollow slab units.

I. Provide headers of cast-in-place concrete or structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.

2.10 SOURCE QUALITY CONTROL:

A. The Owner may employ an independent testing agency to evaluate precast manufacturer's quality control and testing methods.

B. The precast manufacturer shall allow Owner's testing agency access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

C. Dimensional Tolerances: Units having dimensions smaller or greater than required and outside specified tolerance limits may be subject to additional testing as specified here.

D. Precast units having dimensions greater than required will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to meet construction conditions.

E. Strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements that may affect the strength of the precast units, including the following conditions:

1. Failure to meet compressive strength tests requirements.

2. Reinforcement, and pre-tensioning and detensioning tendons of prestressed concrete not conforming to specified fabrication requirements.

3. Concrete curing, and protection of precast units against extremes in temperature not as specified.

4. Precast units damaged during handling and erection.

F. Testing Precast Units: When there is evidence that the strength of precast concrete units may not meet specification requirements, the Owner's testing laboratory will take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:

1. Take at least three representative cores from precast units of suspect strength, from locations directed by Architect.

2. Test cores in a saturated-surface-dry condition per ACI 318 if concrete will be wet when using completed structure.

3. Test cores in an air-dry condition per ACI 318 if concrete will be dry when using completed structure.

4. Strength of concrete for each series of cores will be considered satisfactory if the average compressive strength is at least 85 percent of 28-day design compressive strength.

5. Test results will be made in writing on the same day that tests are made, with copies to Architect, Contractor, and precast manufacturer. Include in the test reports the Project identification name and number, date, name of precast concrete manufacturer, name of concrete testing laboratory; identification letter, name, and type of member or members represented by core tests; design compressive strength, compressive breaking strength and type of break (corrected for length-diameter ratio), and direction of applied load to core with respect to horizontal plane of concrete as placed.

G. Patching: Where core test results are satisfactory and precast concrete units are acceptable for use in Work, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.

H. Defective Work: Remove precast concrete units that do not conform to specified requirements, including strength, tolerances, and finishes. Replace with precast concrete units that meet requirements of this section.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL:

A. Bearing Pads: Install flexible bearing pads where indicated as precast concrete units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.

B. Welding: Perform welding in compliance with AWS D1.1 and D1.4, including qualification of welders.

1. Protect units from damage by field welding or cutting operations and provide non-combustible shield as required.

2. Repair damaged metal surfaces by cleaning and applying a coat of galvanizing repair compound to galvanized surfaces and a compatible primer to painted surfaces.

C. Powder-Actuated Fasteners: Do not use powder-actuated fasteners for attaching accessory items to the surface of a precast, prestressed unit unless otherwise accepted by precast manufacturer.

D. Erection Tolerances: Install precast units without exceeding tolerance limits of PCI MNL-127, "Recommended Practice for Erection of Precast Concrete."

1. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection and joints as follows:

a. Cement grout consisting of 1 part portland cement, 2-1/2 parts sand, and only enough water to properly mix and hydrate.

b. Shrinkage-resistant grout consisting of premixed compound and water to provide a flowable mixture without segregation or bleeding.

c. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

END OF SECTION 03410.

## 1.0 - 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 unit masonry assemblies consisting of , but not limited to the following:

1. Concrete Masonry Units
2. Brick unit masonry
3. Mortar and Grout
4. Insulation in masonry walls

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Flashing and Sheet Metal" for exposed sheet-metal flashing installed in masonry
2. Division 7 Section-07910 - "Joint Sealants" for sealing joint in mockup
3. Division 7 - 07720 - Wall flashing
4. Division 7 - Section 07180 -Dampproofing
5. Division 8 - Section "FRP Doors"
6. Division 8 - Section 08110 -Hollow Metal Doors and Frames

C. Products installed but not furnished under this Section include the following:

1. Hot dip-galvanized Steel lintels for unit masonry
2. Wood nailers and blocking built into unit masonry
3. Manufactured reglets in masonry joints for metal flashing specified in Division 7 Section "Flashing and Sheet Metal."

### 1.3 Submittals

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each different masonry unit, accessory, and other manufactured product specified.

C. Samples for initial selection of the following:

1. Unit masonry samples in full size form showing the full range of colors and textures available for each different exposed masonry unit required.

D. Samples for verification of the following:

1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

a. Include size-variation data for Type FBS brick, verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances.
b. Weep holes/vents in color to match mortar color.

2. Accessories embedded in the masonry.

E. List of Materials Used in Construction Mockups: List generic names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

F. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
2. Each material and grade indicated for reinforcing bars.
3. Each type and size of joint reinforcing.
4. Each type and size of anchors, ties, and metal accessories.

G. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

1. Mortar complying with property requirements of ASTM C 270.
2. Grout complying with property requirements of ASTM C 476.
3. Masonry units complying with property requirements of ASTM C90.

H. 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.

1.4 Quality Assurance

A. Clay Masonry Unit Test: For each clay masonry unit indicated, per ASTM C 67

B. Concrete Masonry Unit Test: For each different concrete mansory unit indicated, per ASTM C 140

C. Mortar Test: Test mortar properties per test methods of ASTM C 270

D. Evaluate mortar composition and properties per ASTM C 780

E. Grout Test: Test grout for compressive strength per ASTM C 1019

F. 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 another means, as acceptable to authorities having jurisdiction.

G. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

H. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

I. Mockup: Prior to installing unit masonry, construct sample wall panel(s) to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

2. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect.
   a. Include exterior face brick wall with field and accent brick and a control joint.
   b. Seal control joint complying with Division 7 Section "Joint Sealants".

3. Build mockups for the following types of masonry full thickness, including face and back-up wythes as well as accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
   a. Typical exterior face brick wall with through wall flashing installed for a 24 inch length in corner of mockup approximately 16" down from top of mockup with a 12 inch length of flashing left exposed to view (omit masonry above half of flashing).
   b. Typical interior masonry unit wall.
   c. Clean exposed faces of mockups with masonry cleaner "Sure Klean 600" or other masonry manufacturer approved cleaner.
   d. Protect accepted mockups from the elements with weather-resistant membrane.

4. Notify Architect one week in advance of the dates and times when mockups will be constructed.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
   a. Acceptance of mockup is for color, texture and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship and other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
   c. When directed, demolish and remove mockups from Project site.
   d. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 Special Inspections

Cooperate and adhere to the requirements of 2021 International Building Code - Special Inspections. All masonry and masonry reinforcing shall be subject to special inspections and

observations, at stage intervals deemed necessary, by the Owners' third party Inspector, Engineer and/or the Architect prior to grout filling.

1.6 Special Markings

A. The contractor shall chalk-line mark the floor slab for masonry wall locations.

B. The contractor shall mark on the floor slab location of reinforcing dowels to serve grouted cells so as to be clear as to locations of vertical cell reinforcement.

C. The contractor shall mark the concrete sub-floor with temporary marker paint to identify location of structural CMU reinforcing dowels so as to accurately locate reinforced cells during wall erection. Markings should be transferred to CMU surfaces as installation allows.

D. Prefabricated Corner and "T" Wall Reinforcing - upon arrival to the job site and while material is in bundle state, the ends shall be spray painted in the field with permanent bright red paint for easy recognition during site inspections.

1.7 Special Sequencing

A. After the special markings have been provided and prior to the start of CMU installation, an inspection of the concrete floor slab and CMU reinforcing dowels shall be required.

B. CMU wall construction designed to receive structural reinforcement and cell grouting shall be installed in such sequencing as to consolidate the work of placing reinforcement and cell grouting to minimum concentrate intervals encompassing such significant quantities as to warrant truck delivery of ready-mixed grout.

C. The work event of placing structural reinforcement and grouting shall require continuous special observation by the Owner's third party Inspector(s) as required by the 2021 International Building Code. Grout mix samples shall be required for testing purposes. The General Contractor shall directly schedule special masonry observations at least 24 hours in advance and notify Architect accordingly. Cost associated with special sequencing shall be considered and included in base bid.

1.8 Delivery, Storage, and Handling

A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

B. Store 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 avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 Project Conditions

A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F

2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

a. 40 to 25 deg F : Cover masonry with a weather-resistant membrane for 48 hours after construction.
b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

## 2.0 - PRODUCTS

### 2.1 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Brick:
   a. Acme Brick Co.
   b. Belden Brick Co.
   c. Cherokee Sanford Group, Inc.
   d. US Brick
   e. Boren
   f. Triangle
   g. Boral
   h. Tri-State

2. Portland Cement, Mortar Cement, Masonry Cement, and Lime:
   a. Essroc Materials, Inc.
   b. Glen-Gery Corporation
   c. Lafarge Corporation

3. Joint Reinforcement, Ties, and Anchors:
   a. Dur-O-Wal, Inc.
   b. Heckman Building Products, Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire-Bond

### 2.2 Concrete Masonry Units

A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.

2. Bullnose units are required for all outside corners of vertical surfaces, unless otherwise indicated.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,000 psi.
2. Weight Classification: **NORMAL**
3. Aggregates: Do not use aggregate made from pumice, scoria or tuff.
4. Provide Type N-I moisture-controlled units
5. Size: Manufactured to the actual dimensions indicated on Drawings within tolerances specified in the applicable referenced ASTM specification. Typical unit 8" nominal, 6" nominal, 4" nominal, or 12" nominal as indicated on drawings.

C. Custom Textured and Color Concrete Masonry Split Face Units

Units shall be made with either white marble or white limestone to meet ASTM C - 90-90 Type I. Units shall be of size as indicated and/or as required and shall be laid in stack bond. Furnish all necessary halves, flush ends, and specials. Face detail shall be as indicated on drawings and details.

2.3 Brick

A. General: Provide shapes indicated and as follows for each form of brick required.

1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes and lintels.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTM C 216 and as follows:

1. Grade and Unit Compressive Strength: Provide units with grade and minimum average net-area compressive strength indicated below:
   a. Grade: SW. With color through brick to match existing school brick predominant on buildings in the school complex or as otherwise selected by the architect.
2. Type: FBS. With color through brick as selected by the architect.
3. Size: Bricks manufactured to the following actual dimensions within tolerances specified in ASTM C 216:
   a. Standard: 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long.
4. Application: Use where brick is exposed, unless otherwise indicated.
5. Color and Texture: As selected by the architect.

D. Brick Schedule
1. Contractor to provide an allowance (materials only) for the brick. See Section 01020 – Allowances.

2.4 Mortar and Grout Materials

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Masonry Cement: ASTM C91

C. Hydrated Lime: ASTM C 207, Type S (for CMU) Type N (for face brick).

D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.

1. White-Mortar Aggregates: Natural white sand and or ground white stone.

F. Aggregate for Grout: ASTM C 404.

G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

H. Cold Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C; and recommended by the manufacturer for use in masonry mortar of composition indicated.

I. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.

J. Water: Potable.

K. Products: Subject to compliance with requirements, provide one of the following:

1. Cold Weather Admixture:
   a. "Accelguard 80"; Euclid Chemical Co.
   b. "Morset"; W. R. Grace & Co.

2. Mortar shall be approved equal to Lafarge as selected by Architect from full range of mortar colors available.

2.5 Ties and Anchors, General

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated. Provide ties that will extend into the brick veneer a minimum of one half of the veneer width.

B. Wire: As follows:
1. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating for wire ties and anchors in exterior walls.
2. Wire Diameter: 0.1875 inch.

2.6 Bent Wire Ties and Cornices

A. Individual units prefabricated from bent wire to comply with requirements indicated below:

1. Type for Masonry where Whythes are of Different Material: Adjustable ties composed of 2 parts; 1 with pintles, the other with eyes; with maximum misalignment of 1-1/4 inches. Ties shall be long enough to extend through rigid wall insulation and into outer wythe a minimum of 2 inches.

B. Joint Reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', with prefabricated corner and tee units, and complying with requirements indicated below:

1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
2. Ladder design with cross rods spaced not more than 16" o.c. One side rod for each face shell of concrete masonry back-up and one rod for brick wythe.
3. Wire Size: 0.1875" diameter for deformed rods; No. 9 cross rods.
Hot dipped galvanized, Class 3. H. Reinforcing:

4. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Barnard Lox-All Adjustable Eye-Wire, Dur-o-wall or equal.

2.7 Embedded Flashing Materials

A. Vinyl Flashing:

1. Thickness: 40 mil thick.
2. Application: Use where flashing is fully concealed in masonry

B. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

C. Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to the following:

1. Vinyl Flashing:
   a. Gibraltar
   b. Nervastral
   c. AFCO

2.8 Single-Wythe CMU Flashing

Single-Wythe Concrete Masonry Unit Drainage System: BlockFlash™
Install CMU cell flashing pans with built in adjoining bridge made from recycled polypropylene with chemical stabilizers that prevent UV degradation. Flashing pans have a sloped design to direct moisture to the integrated weep spout. Designed to be built into mortar bed joints to expel moisture (unimpeded by mortar droppings) to the exterior of CMU walls. Drainage Mats and Insect Guards included. Product: Subject to compliance with requirements, provide "BlockFlash™" as manufactured by Mortar Net Solutions.

2.9 Miscellaneous Masonry Accessories

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from Neoprene.

B. Preformed Metal Control-Joints: Heckman 16 oz. copper – Type 93U, designed to fit brick size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep Holes: Provide the following:

1. Wicking material: Cotton sash cord in length required to produce 2 inch exposure on exterior and 18 inches in cavity between wythes.

E. Sealer for Brick: Prosoco-Siloxane-Weather Seal

F. Rebar Positioners: 3/16" diameter, hot-dipped galvanized and provided at 48" vertical centers in each reinforced cell.

2.10 Wall Reinforcement and Anchors

A. Continuous wall reinforcement at 16" o.c. for all masonry walls shall be hot-dipped galvanized and of either truss or ladder design with tabs for exterior two Wythe walls. Reinforcement shall have not less than No. 9 steel wire cross rods and No. 9 deformed side rods. Wires shall conform to ASTM A82. Reinforcement shall have

a drip when used in cavity walls, use rectangular pintle sections 16" o.c. in back-up masonry and adjustable double eyelet sections in face brick where rigid insulation is indicated or required in cavity space or where face brick and back-up masonry is not run up together. Use manufacturer's pre-formed corners and intersecting sections and splice as recommended. Basis of material selection shall be Hohmann & Barnard #270 or approved equals by Heckmann Building Products, Wire Bond and Dur-O-Wall.

2.11 Masonry Cleaners

A. Job Mixed Detergent Solution: Solution of ½ cup dry measure tetrasodium polyphosphate and 1/2 cup dry measure laundry detergent dissolved in 1 gallon of water.

B. Proprietary Detergent Solution: Manufacturer's standard strength cleaner designed for removing mortar/grout stains, efflorescence and other new construction stains from new masonry surfaces as acceptable to masonry material manufacturer. "Sure Klean" No. 600 Detergent; ProSoCo, Inc., or approved equal. Do not use acid cleaners.

2.12 Mortar and Grout Mixes

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

B. Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

1. Limit cementitious materials in mortar to portland cement-lime.

2. Use Type S or N mortar.

D. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1-to-10, by weight.

E. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and non-reinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Grout to have minimum 2,500 psi compressive strength at 28 days when tested in accordance with ASTM C1019.

1. Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.
2. Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

## 3.0 - EXECUTION

### 3.1 Examination

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
2. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

### 3.2 General

A. Lay out all masonry work according to the dimensions shown on the drawings. No work shall be laid unless the temperature is 35° F. and rising.

B. All masonry work shall be laid straight, level, plumb, and true. Exterior walls shall be laid continuously around the entire structure and in no case racked up more than five (5) feet.

C. Build in all flashing, anchors, reinforcing, inserts, wall plugs, lintels, bearing plates, bond beams and items as required to accommodate the work of others.

D. All special details such as chases, openings, expansion joints, projections, corbels, etc., shall be built as required and/or indicated on the drawings.

E. Lay all masonry, brick and block in full bed of mortar completely filling all joints with mortar. Allow for caulking joints at all window and door frames, and at all wall intersections.

F. Joints of all exposed masonry surfaces shall be finished after the mortar has taken its initial set. Use a straight edge for horizontal joints. Vertical joints shall be in alignment from top to bottom.

G. At the end of each day or when rain or frost is imminent, the tops of masonry walls and similar surfaces shall be properly protected by covering top of wall with a strong waterproof membrane well secured in place.

H. Consult all other trades in advance and make provisions for the installation of their work to avoid cutting and patching. Do all cutting and patching of masonry required to accommodate work of others.

I. Unfinished work shall be stepped back to permit joining of new work. Masonry work may be toothed only when approved. Before connecting new work with work previously built, sweep clean, remove loose mortar and thoroughly wet the old brick.

J. As the work progresses, mortar daubs and smears shall be cleaned from masonry work.

K. Door frames shall be set before the masonry walls are built. As the masonry walls are built around these frames, the inside of the frames shall be grouted solid with mortar. NOTE: See HOLLOW METAL DOORS AND FRAMES - SECTION 08110 for requirements to coat interior of frames prior to grouting.

L. Extend all rated walls to the underside of structural deck above unless otherwise approved. Fit walls neatly with all joints filled where two levels of ceiling occur, extend walls to high level. Extend all partition walls to 8" above adjacent ceiling.

M. Weep holes: Provide weep holes in head joints 32" o.c. at thru wall flashing where air space is not open downward. Weep holes shall be below finish floor line and above finish grade.

N. MORTAR IN CONTACT WITH COPPER PIPING WILL NOT BE ACCEPTED. Coordinate with plumbing or mechanical contractor if copper is encountered without sleeving/insulation. Anticipate additional corrective work.

3.3 Installation, General

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.

C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

3.4 Construction Tolerances

A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet , nor 1/2 inch maximum.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.

C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet) or more.

D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.

E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.5 Laying Masonry Walls

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

C. Bond Pattern for Exposed Masonry:

1. Stack Bond Pattern

D. Lay concealed masonry with all units in a wythe as above. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.

F. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

J. Build non load-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Wedge non load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.6 Mortar Bedding and Jointing

A. Lay hollow concrete masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed all webs in mortar.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
4. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
5. Fill bottom course of all CMU solid with mortar.
6. Fill all courses of CMU adjacent to fill in area of ramp and stage solid with mortar.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.
1. Lay all brick with full head and bed joints.
2. At cavity walls, bevel beds away from cavity to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against cavity face of brick.
3. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4-to-3/8-inch joints. Three brick courses and three mortar courses in 8-inch vertical to course with CMU.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

D. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.7 Structural Bonding of Multiwythe Masonry

A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties as shown, but not less than 1 metal tie for 4 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown. Provide continuity with horizontal joint reinforcing at corners by using prefabricated "L" units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space by providing continuity with horizontal joint reinforcing at corners by using prefabricated "T" units.

3.8 Cavities

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
2. Tie exterior wythe to back-up with individual metal ties. Stagger alternate courses.

3.9 Anchoring Masonry to Structural Members

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Space weldable rebar couplers at horizontal bond beams as indicated, but not more than 24 inches o.c. vertically.

3.10 Cavity Wall and Masonry Cell Insulation

A. On units of plastic board insulation, place small dabs of adhesive, spaced approximately 12 inches o.c. both ways on inside face or attach to inside face with plastic fasteners designed for his purpose. Verify compatibility of adhesive and bituminous damproofing specified in Division 7. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

B. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.11 Horizontal Joint Reinforcement

A. General: Provide continuous horizontal joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, ½" elsewhere. Lap reinforcing a minimum of 6 inches.

1. Space reinforcement not more than 16 inches vertically o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement in mortar joints 1 block course above and below wall openings and extending 12 inches beyond opening.
   a. Reinforcing above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

3.12 Control and Expansion Joints

A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through

movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry by installing preformed control-joint gaskets designed to fit standard sash block.

C. Form expansion joints in brick made from clay or shale by forming an open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Maintain joint free and clear of mortar.

3.13 Lintels

A. Install steel lintels where indicated.

B. Provide pre-cast masonry lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.14 Flashing, Weep Holes, and Vents

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashing as follows:

1. At composite masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches unless otherwise indicated.
2. At lintels and shelf angles extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.
3. Flashing installation is to be inspected and approved in writing by Architect before proceeding with masonry work.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Form weep holes with product specified in Part 2 of this Section.
2. Form weep holes by keeping head joints free and clear of mortar.
3. Space weep holes 24 inches o.c.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

1. Install through-wall flashing and weep holes above horizontal blocking.

F. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.15 Grouting of CMU Walls

A. Contractor to notify Owner's Testing Agent prior to all grouting of steel reinforced CMU.

B. All cavities with steel reinforcing to be cleaned of all debris and broken CMU prior to filling with grout.

C. All reinforcing steel in cells to be filled with grout or concrete to be continuous with laps as required by code.

D. Grout for filled masonry cells is not to be dropped more than five (5) feet.

3.16 Repairing, Pointing and Cleaning

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised, using approved masonry cleaner.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.17 Sealing of Brick

A. Take precautions to avoid harm to building occupants, pedestrians, nearby property and all non-masonry surfaces from contact with sealer and fumes. Protect and/or divert auto and pedestrian traffic.

B. Test masonry (minimum 4 ft x 4 ft area) before overall application to assure compatibility and desired water repellent results. (Treated and cured masonry should shed water and not wet out.) Apply tests using the same equipment as for job application and allow to cure 24 to 48 hours. Test panels should remain available for inspection by Architect.

C. Surface Preparation:

1. Fill all cracks and voids to avoid penetration of fumes into the building. (Such openings may permit moisture, sealer or sealer fumes to penetrate wall.) Make sure that all caulks and sealants are in place and completely cured.
2. Clean dirt, oil and other contaminants from the surface. Use appropriate proprietary cleaners (do not use raw acids) where necessary. Rinse with pressure equipment at 500 to 1,500 psi to thoroughly remove all detergent residues. Do not apply to surfaces that are wet to the touch. Best results are obtained on dry surfaces. Internal moisture should also be dissipated.

3.18 Masonry Waste Disposal

A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the project site.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

3. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Submit all shop drawings on three copies only unless specified otherwise in the general conditions. Two prints will be returned to the architect. All copies required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.

B. Product data 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). This data is submitted for information only.

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.

2. High-strength bolts (each type), including nuts and washers.

a. Include Direct Tension Indicators if used.

3. Structural steel primer paint.

4. Shrinkage-resistant grout.

C. Shop drawings including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

2. Provide setting drawings, templates, and directions for installation of anchor bolts and other

anchorages to be installed as work of other sections.

3. Contract documents shall not be used for shop drawing, including erection plans or details.

4. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.

5. All structural steel connections not specifically detailed on the drawings shall be designed to resist forces indicated, by the Contractor.

D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges", dated June 10, 1992.

a. General: AISC "Code of Standard Practice" shall apply except to the extent that references are made to the responsibility of the Owner and/or Architect or Engineer in which event those references shall have no applicability. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.

2. AISC "Specifications for Structural Steel Buildings," including "Commentary".

3. AISC "Specifications for Structural Steel Buildings, Section 10, Architecturally Exposed Structural Steel".

4. "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Structural Connections.

5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."

6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and

relubricate before use.

1. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel: ASTM A992, Grade 50 for wide flange beams; ASTM A36 elsewhere.

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.

D. Hot-Formed Steel Tubing: ASTM A501.

E. Steel Pipe: ASTM A53, Type E or S, Grade B; or ASTM A501.

F. Moment Connection Material: Unless noted otherwise on the drawings, stiffener plates, doubler plates, gusset plates and the connecting plates shall be the same grade of steel as members being connected.

G. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.

H. Anchor Rods: ASTM A307 Grade A, headed type with supplementary requirements S1, unless otherwise indicated.

I. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.

J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325.

a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B695, Class 50, or hot-dip galvanized complying with ASTM A153.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.

K. Electrodes for Welding: Comply with AWS Code.

L. Structural Steel Primer Paint: Red oxide primer.

M. Cement Grout: Portland cement (ASTM C150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by

volume, with minimum water required for placement and hydration.

N. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive,nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

a. 100 Non-Shrink Grout (Non-Metallic); Conspec, Inc.
b. Supreme Grout; Cormix, Inc.
c. Sure Grip Grout; Dayton Superior.
d. Euco N.S.; Euclid Chemical Co.
e. Crystex; L & M Construction Chemicals, Inc.
f. Masterflow 713; Master Builders.
g. Sealtight 588 Grout; W. R. Meadows.
h. Propak; Protex Industries, Inc.
i. Set Non-Shrink; Set Products, Inc.
j. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.

2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

1. Bolt field connections, except where welded connections or other connections are indicated.

a. Provide high-strength threaded fasteners for all principal bolted connections, except where unfinished bolts are indicated.

C. Simple Beam Connections: Standard double angle framed beam connections using bolts as specified.

1. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with Architectural or MEP requirements.

D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts."

E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

F. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall

framing. Straighten as required to provide uniform, square, and true members in completed wall framing.

G. 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.

H. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.

1. Do not paint surfaces to be welded or high-strength bolted with slip-critical-type connections.

2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.

3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

1. Promptly remove and replace materials or fabricated components that do not comply.

B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

A. Surveys: Employ a licensed land surveyor 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. Setting Bases and Bearing Plates: 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.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

2. 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.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

4. For proprietary grout materials, comply with manufacturer's instructions.

E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

F. Level and plumb individual members of structure within specified AISC tolerances.

G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

H. Splice members only where indicated and accepted on shop drawings.

I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces. Each erection bolt on shop drawings shall be noted "Erection Bolt".

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2 QUALITY CONTROL

A. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

C. 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.

D. Testing agency may inspect structural steel at plant before shipment.

E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

F. Field Inspections and Tests:

1. Check steel as received in the field for possible shipping damage workmanship, piece making and verification of required camber.

G. Shop-Bolted Connections:

1. Inspect or test in accordance with AISC specifications.

2. For bolted connections (bearing-type), all connections shall be visually observed to assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.

H. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.

3. Perform tests of welds as follows. Inspection procedures listed

a. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.

I. Field-Bolted Connections:

1. Inspect in accordance with AISC specifications.

2. For bolted connections (bearing-type), all connections shall be visually observed to assure that all bolts, nuts and washers are in place and that all plies of connection material have been drawn together. All bolts shall be verified to be snug tight only.

3. Bolts in slotted holes at expansion joints shall have nuts finger tight with threads damaged.

J. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of

defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds, including but not limited to fit-up, intermediate passes and final weld.

3. Perform tests of welds as follows:

   a. Ultrasonic Inspection: ASTM E164. Perform on all full and partial penetration welds.

END OF SECTION 05120.

# 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 Design and or Build work of the following:

1. Exterior load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Roof trusses
   a. Gable-shaped trusses
   b. Piggyback Trusses.
4. Roof rafter framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

C. The extent of cold formed metal framing is shown on the drawings, including notes, elevations and details to show basic layout and location of members, typical connections, and type of steel required.

D. Section includes all work and supplementary items required to complete the proper installation of the pre-engineered cold formed metal framing as shown on the drawings and specified herein including headers, outriggers, supplemental rafters and incidental framing for a cold formed metal framing assembly within the extent shown on the drawings.

E. Cold formed metal framing includes planar structural units consisting of welded, screwed or bolted connected members which are fabricated, cut and assembled prior to delivery or at the job site.

## 1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated. Design bridging and other temporary and permanent bracing for same loads as used to design cold formed metal framing plus any temporary loads and permanent loads resulting laterally bracing of members.

1. Engineering Responsibility: Manufacturer's responsibilities include using a qualified professional engineer to prepare structural analysis data for cold formed metal framing. All cold formed metal framing not specifically detailed on the drawings shall be designed to

resist forces indicated, by the Contractor, under the direct supervision of a professional engineer registered in the State where the project is located. Engineer/firm shall provide proof of professional liability insurance for said engineering responsibility.

a. Design calculations for the Cold formed metal framing designed by the Contractor shall be submitted for the files of the Architect and Engineer. Calculations shall bear the seal of a professional engineer registered in the State where the project is located. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittal.

2. Design Loads: As follows:

   a. Dead Loads: Weights of materials and construction.
   b. Roof Live Loads: 20 PSF
   c. Wind Loads: As indicated in drawings.
   d. Seismic Loads: As indicated in drawings.
   e. Loads indicated on drawings plus concentrated loads hung from or supported on trusses. Refer to mechanical, electrical and plumbing drawings and specifications for loading information and location. Loading as required by other subcontractors, such as fire protection, shall be coordinated by the General Contractor.

3. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600 of the wall height.
   b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.
   c. Roof Trusses: Vertical deflection of 1/240 of the span up to ¾ inch total dead load and ¾ inch total live load.
   d. Roof Rafter Framing: Horizontal deflection of 1/240 of the horizontally projected span up to ¾ inch total dead load and ¾ inch total live load.

4. 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 60 deg F (67 deg C).
5. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

   a. Upward and downward movement of 1/2 inch (13 mm).

6. Holes in Members: Design for holes in members where shown for securing other work to trusses; however, deduct area of holes from the area of chord when calculating strength of member.

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.
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 SUBMITTALS

A. This project is a 'Total Design and or Build' construction delivery system and review of submittals by the Owner or his representative does not relieve the 'Design and or Build' Contractor of design duties, construction responsibility or liability for improper design, function or performance. The review by Owner is not an independent design check of final plans and methods of construction by and will not in any way relive the 'Design and or Build' contractor of sole design and construction responsibility for the successful completion and long term stability of the work.

B. Product Data: For each type of cold-formed metal framing product and accessory indicated.

C. Shop Drawings: Show layout, spacing, sizes, thicknesses, pitch, span, camber 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. Shop drawings shall include all placement sequences and instructions.
   1. Submit all shop drawings on three copies only unless specified in the general conditions. Two prints will be returned to the architect. All other reproductions required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.
   2. Architect's and Engineer's Shop Drawing Review: Review of shop drawings will be for general considerations only. Compliance with requirements for materials, fabrication, engineering, dimensions, bracing, and erection is the Contractor's responsibility.
   3. If there are questions, clarifications, modifications, or other items where information, a response, or approval is requested, such items must be written on the cover sheet to the submittal. Only indicating such items on the shop drawings or within the calculations is not sufficient. Where items are not specifically listed on the cover sheet and subsequently explicitly approved by the Structural Engineer of Record, such items are not to be considered approved or considered.
   4. Submit design analysis and test reports indicating loading, section properties, allowable stress, stress diagrams and calculations, and similar information needed for analysis and to insure trusses comply with requirements.
   5. 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 licensed to practice in the state where the project is located. Shop drawings which do not contain this information will be returned unchecked.
   6. Submittals shall additionally conform to the requirements shown on the General Notes of the project Structural Drawings.
   7. Provide permanent bracing drawings for the metal stud truss system. Permanent bracing shall be designed by the contractor under the direct supervision of the professionally registered engineer licensed in the state that the project is located. The permanent bracing shop drawings and calculations shall be submitted with the truss shop drawings and calculations. The permanent bracing and metal stud shop drawings are to be considered one submittal. If one is submitted without the other the submittal will be returned rejected.

D. Welding certificates.

E. Qualification Data: For professional engineer and testing agency.

F. 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.

G. 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, ductility, 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. 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."

G. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 FABRICATOR'S QUALIFICATIONS

A. Cold formed metal framing shall be designed, fabricated, and erected by a firm which has a record including a minimum of five years of successfully designing, fabricating, and erecting cold formed metal framing assemblies similar to scope required and which practices a quality control program. Fabricators shall additionally be qualified with at least one year experience in using Building Information Modeling (BIM) from inception to producing shop drawings.

B. Fabricators who wish to qualify for approval under this Section of the specification shall submit evidence of compliance with this specification no later than ten (10) days prior to the bid date. Only those fabricators approved in writing by the Architect prior to the bid date will be accepted.

1.7 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.

C. Do not store materials on structure in a manner that might cause distortion or damage to supporting structures.

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. California Expanded Metal Products Company.
3. Clark Steel Framing.
4. Dale/Incor.
5. Dietrich Metal Framing; a Worthington Industries Company.
6. Formetal Co. Inc. (The).
7. Innovative Steel Systems.
8. MarinoWare; a division of Ware Industries.
9. Southeastern Stud & Components, Inc.
10. Steel Construction Systems.
11. Steeler, Inc.
12. Super Stud Building Products, Inc.
13. United Metal Products, Inc.

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: Minimum of Grade 33 or as required by structural performance.
2. Coating: G60 (Z180).

B. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50 (340), Class 1 or 2 or as required by structural performance.
2. Coating: G90 (Z275).

2.3 EXTERIOR 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: 0.0329 inch (0.84 mm).
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

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: 0.0329 inch (0.84 mm) or matching steel studs.
2. Minimum Flange Width: 1-1/4 inches (32 mm).
3. Section Properties: as required by structural performance.

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: 18ga
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: 18 ga
2. Top Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

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: 0.0329 inch (0.84 mm).
2. Minimum Flange Width: 1-5/8 inches (41 mm).
3. Section Properties: as required by structural performance.

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: 18 ga or matching steel studs.
2. Minimum Flange Width: 1-1/4 inches (32 mm)].
3. Section Properties: as required by structural performance.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

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. Dietrich Metal Framing; a Worthington Industries Company.
    b. MarinoWare, a division of Ware Industries.
    c. SCAFCO Corporation
    d. The Steel Network, Inc.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

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. Dietrich Metal Framing; a Worthington Industries Company.
    b. MarinoWare, a division of Ware Industries.
    c. SCAFCO Corporation
    d. The Steel Network, Inc.

3. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
4. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

E. Contractors' Option Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
    b. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
    b. Flange Width: outer deflection track flange width plus 1 inch (25 mm).

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

## 2.5 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard-shape steel sections, C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges. Proprietary shape trusses are

acceptable provided all engineering calculations are performed by the manufacturer or his agent.

1. Minimum Base-Metal Thickness: as required by structural performance..
2. Flange Width: as required by structural performance.
3. Section Properties: as required by structural performance.

2.6 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 18 ga.
2. Flange Width: 1-5/8 inches (41 mm) minimum.
3. Section Properties: as required by structural performance.

B. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section rafter track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) or Matching steel rafters.
2. Flange Width: 1-5/8 inches (41 mm, minimum.

2.7 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. Rafter hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.8 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 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.

## 2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or 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 (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.10 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 (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) 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 (3 mm).

D. Cold formed metal framing to be fabricated at the fabricator's shop in the largest sections possible to transport and erect.

E. All cold formed metal framing shall be fabricated and erected in strict accordance with the current printed instructions of the approved subcontractor or fabricator.

F. All cold formed metal framing components shall be straight and true prior to fabrication. Flattening or straightening of components, when necessary, shall be accomplished in a manner so as to not damage the component.

G. All cold formed metal framing components shall be cut neatly to fit snugly against adjacent members.

H. No splices will be allowed in cold formed metal framing except as authorized in writing by the Architect or as shown on the approved shop drawings.

I. Framing components shall be field or shop fabricated and joined to one another by means of welding or through the use of screws.

J. Completed cold formed metal framing shall be free from twists, bends, or open joints with all members straight and true to line.

K. Welds must be thoroughly cleaned and wire brushed and primed and painted with a high zinc content paint capable of providing an equal or greater degree of protection than the original G-60 galvanized coating.

L. Bridging: Fabricate horizontal or diagonal type bridging for cold formed metal framing as required to prevent buckling of members where sheathing applied to the cold formed metal framing members is not present or is not adequate to brace the cold formed metal framing member. Bridging shall transfer all forces to the roof diaphragm.

M. End Anchorage: Fabricate end anchorages to secure cold formed metal framing to adjacent construction.

N. Fabricate all clips, angles, henways and other miscellaneous pieces necessary to attach cold formed metal framing to the substructure or to attach other components within this section to one another.

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. Structural Adequacy: Contractor shall prepare the structure to insure proper and adequate structural support for the materials specified.

B. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

C. 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.

D. 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 rafter locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

E. 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 rafter 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 (1.6 mm).

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 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed rafters, 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 (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

## 3.4 EXTERIOR 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: To match stud spacing.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) 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 (406 mm).

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 a minimum of 48 inches (1220 mm) apart or as required by structural performance. 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 (150 mm) 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 (406 mm).

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows but not more than 48 inches (1220 mm) apart or as required by structural performance. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

    a. Install solid blocking at 96-inch (2440-mm) centers.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. 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.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. 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 ROOF RAFTER INSTALLATION

A. Install perimeter rafter track sized to match rafters. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install rafter bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten rafters to both flanges of rafter track.

1. Install rafters over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of rafters with web stiffeners, end clips, rafter hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space rafters not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Rafter Spacing: 24 to 48 inches or as required by structural performance.

D. Frame openings with built-up rafter headers consisting of rafter and rafter track, nesting rafter, or another combination of connected rafters if indicated.

E. Install rafter reinforcement at interior supports with single, short length of rafter section located directly over interior support, with lapped rafters of equal length to rafter reinforcement.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals as required by structural performance Fasten bridging at each rafter intersection as follows:

1. Bridging: Rafter-track solid blocking of width and thickness indicated, secured to rafter webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and rafter-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of rafters and secure solid blocking to rafter webs.

G. Secure rafters to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous rafter framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable rafter-framing assembly.

## 3.7 TRUSS INSTALLATION

A. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.

B. Truss Spacing: 48 inches (1220 mm).

C. Do not alter, cut, or remove framing members or connections of trusses.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

E. Erect trusses without damaging framing members or connections.

F. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

G. Install continuous bridging and permanently brace trusses as required by structural performance and designed according to LGSEA's Technical Note 551e, "Design Guide for Permanent Bracing of Cold-Formed Steel Trusses."

H. Trusses shall be braced against racking. Lifting of trusses shall be done so as to not cause local distortion in any member.

I. All trusses shall be erected using equipment of adequate capacity to safely perform the work.

J. The General Contractor is responsible for checking the dimensions and assuring the fit of all members and trusses before erection begins.

K. All work shall be erected plumb and level and to dimensions and spacings indicated on the drawings. Provide bridging and permanent bracing as shown in the shop drawings.

L. Assemblies shall be of the size and spacing shown on the approved shop drawings.

M. Provide web stiffeners and reinforcement at reaction points where required by analysis or to suit details.

N. Hoist units in place by means of lifting equipment suited to sizes and types of trusses required, applied at designated lift points as recommended by fabricator, exercising care not to damage truss members.

O. Provide temporary bracing as required to maintain trusses plumb, parallel and in location indicated, until permanent bracing is installed.

P. Anchor trusses securely at all bearing points to comply with methods and details indicated.

Q. Install permanent bracing and related components to enable trusses to maintain design spacing, withstand design loads, and comply with other indicated requirements.

R. Do not cut or remove truss members.

S. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

T. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening.

## 3.8 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 per Specification Section 01410.

B. Field and shop welds will be subject to testing and inspecting.

C. Provide Access for testing agency to places where truss work is being fabricated or produced so that required inspections, observations and testing can be accomplished.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Remove and replace work where test results indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Architect reserves the right, at any time before final acceptance, to reject material not complying with specified requirements regardless of when testing agency completed inspection, observation or testing.

## 3.9 REPAIRS AND PROTECTION

A. 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.

B. 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

## 1.0 - GENERAL

1.1 Scope
Furnish and install all miscellaneous metals as indicated on drawings, including that shown only on Architectural Drawings, and/or as specified.

1.2 Submittals
Submit shop drawings for approvals.

1.3 Applicable Standards
Fabrication and erection, except as specified otherwise, shall be in accordance with American Institute of Steel Construction (AISC) Specifications for the Design, Fabrication and Erection of Structural Steel for Building.

1.4 Qualification
Manufacturer's names, models, or catalog numbers, referred to herein are intended to show the type, quality and intent of items required. Products of other manufacturers equal or better in quality, similar in design are acceptable subject to the Architect's approval.

1.5 Substitutions
Substitutions of sections or modifications of details shall be submitted with the shop drawings for approval. Approved substitutions, modifications, and necessary changes in related portions of the work shall be coordinated by the contractor and shall be accomplished as no additional cost.

## 2.0 - PRODUCTS

2.1 General Materials

A. Metals shall be free from defects impairing strength, durability, or appearance and of the best commercial quality for the purposes specified. All materials shall be new materials and shall have structural properties to sustain safely or withstand strains or stressed to which normally subjected. All exposed fastenings shall be of same material, color and finish as the metal to which applied unless otherwise shown.

B. Provide all accessories such as anchors, hangers, belts, toggle bolts, expansion bolts, rods, shelf angles, clip angles, shims, connections, stiffeners, reinforcements, screws, etc., required for proper complete fabrication, assembly and installation of all miscellaneous steel, metal work and masonry. Bolts, screws, expansion bolts, toggle bolts, etc, shall be brass, bronze, stainless steel or aluminum when used with these metals.

C. Steel lintels and miscellaneous structural shapes where called for shall be of shapes, lengths and weights, as shown and detailed on the drawings, spanning openings where so indicated, shall be complete with bolts, anchors, etc., for building in. Lintels shall not have less than eight (8") inch bearing upon masonry.

D. Galvanized steel shall be hot-dipped galvanized in accordance with the Standard Specifications of the American Hot-Dip Galvanizing Association. Galvanizing shall be done after fabrication.

E. All materials shall be well formed to shape and size with sharp lines. Conceal fasteners where practical. Thickness of metals and details of assembly and

supports shall give ample strength.

F. Welding shall conform to American Welding Society's Standard Code for Arc and Gas Welding in Building Construction. Welding shall be continuous along entire area of contact, except where tack welding is specifically shown or specified. Tack welding will not be permitted on exposed surface. Grind all exposed welds smooth.

2.2 Painting and Protective Coating

A. Thoroughly clean off all miscellaneous metal, using power tool cleaning to remove all dirt, grease, rust, and scale and foreign matter.

B. Treat only concealed galvanized metal with galvanized metal primer as per manufacturer's directions before painting. Exposed galvanized metal to be primed and finished under Painting Section.

C. Unless otherwise specified, paint all metal items, including concealed galvanized metal, one shop coat of Red or Grey oxide zinc chromate TT-P-636-C. Surfaces inaccessible after assembly shall be painted before assembly. Work paint thoroughly into joints, etc. Do not paint bronze, aluminum or stainless steel.

D. Insulate faces of all metals in contact with different metals, wood, masonry, and/or concrete; give each contact surface one coat approved alkali-resistant bituminous paint. Let both surfaces dry before installing metals.

2.3 Miscellaneous Metal Items

The following items are intended as a guide to such work in this project and do not necessarily limit the scope of this section.

A. All structural shapes indicated and/or required.

B. Miscellaneous Steel Lintels. Provide miscellaneous steel lintels indicated on Architectural and/or Structural Drawings or as required. All miscellaneous steel lintels are subject to structural engineer's review and approval.

C. Protective Bollards shall be steel pipe with prefabricated stock cap 6" diameter 7' steel painted pipe bollards filled with concrete set 3'-6" deep in 15" diameter concrete footing. Bollards shall be placed 3'-6" from connection and spaced around the perimeter at 48" o.c. max.

D. Windstop Angle between new and existing construction shall be 4" x 4" x 1/4" continuous angle with vertical slots 16" o.c.; #10 gauge galvanized wire masonry loops 16" o.c. Fill joint to within 1/2" of each face; sealant each side.

E. Downspout Boots shall be equal to Jay R Smith MFG. Co. (Smith Industries) special downspout boots. Cast Iron Body with 3" Bronze Access Plug and Strap with 5/16" Dia. Cast Holes for flat head bolts, Typical. 5 x 4 Size.

F. Wire Mesh Panels – Shall be 3" x 3" x .192" galvanized welded wire mesh as manufactured by Miller Wire Works, California Wire Products or pre-approved equal.

## 3.0 - EXECUTION

3.1 Fabrication

A. Verify measurements in field for work fabricated to fit job conditions.

B. Fabricate form work true to detail with clean, straight, sharply defined profiles. Iron shall have smooth finished surfaces unless indicated otherwise. Shearing and punching shall leave clean, true lines and surfaces.

C. Fastenings shall be concealed where practical. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to the weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

D. Joints shall be rigid at adjoining sections for a strong assembly. Weld or rivet permanent connections. Welds shall be continuous and finished flush and smooth on surfaces that will be exposed after installation. Do not use screws or bolts where it can be avoided; where screws or bolts are used, the heads shall be countersunk, screwed up tight and threads nicked to prevent loosening. Unexposed welded joints may be continuous or spot welded as required. Remove weld spatter from adjacent surfaces.

3.2 Installation

A. Erect work in thorough, first class manner with mechanics experienced in the erection of iron work.

B. Work shall be strong, secure, and adequate for the purpose intended.

C. Schedule delivery of items to be built into the masonry so as not to delay the progress of the work and to coordinate for proper installation.

D. Place and properly secure to form work items such as anchors, sleeves, and inserts which are to be cast in concrete.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work under this section consists of all rough carpentry work.

1.2 General

A. Rough carpentry shall generally include all rough framing, furring, grounds, bucks, blocking and such other wood work as required.

B. Carpentry shall also include all temporary bracing, shoring and centering as required for the support or protection of the work.

1.3 Cooperation With Other Trades

The work under this section includes the necessary cutting and patching required for the proper installation of work of other trades. Work which is to be built in by others shall be accurately positioned and properly built in to secure the work of this section. Temporary centering, bracing and shoring shall be provided as required for the support and protection of masonry work during construction.

1.4 Delivery and Storage

Lumber and other materials specified herein shall be delivered, handled and stored in order to prevent damage and absorption of excess moisture. Lumber shall be stored in such a manner as to insure proper ventilation and protection from the weather.

## 2.0 - PRODUCTS

2.1 Lumber

A. All dimensional lumber used under this section shall be thoroughly dried No. 2 Southern Yellow Pine or No. 2 Douglas Fir of sizes, shapes and lengths required. Moisture content shall not exceed 19% at time of installation.

B. All wood shall be sound, flat, straight, well-seasoned, thoroughly dry and free from structural defects. Warped or twisted wood shall not be used.

C. Lumber grades shall conform to the grading rules of the manufacturer's association under whose rules the lumber is produced. All lumber shall be grade-marked.

2.2 Plywood

A. Each panel of softwood plywood shall be identified with the DFPA grade trademark of the American Plywood Association and shall meet the requirements of Product Standard PS 1-66 for Softwood Plywood Construction and Industrial. All plywood which has any edge or surface permanently exposed to the weather shall be of the exterior type.

B. Plywood sheathing and/or decking shall be DFPA Standard with exterior glue, thickness as shown on the drawings or required for the intended use. Square edge or tongue and groove as approved.

C. Plywood for roof decking shall be 3/4" minimum CDX with C grade up. Provide "H" clips at mid-span of edge joints.

2.3 Oriented Strand Board (OSB)

A. Shall be used for floor, wall and roof sheathing in light commercial construction applications as indicated. Each panel is third-party certified

for quality and is rated for Exposure 1 bond durability for protected applications and limited exposure during normal construction delays. OSB shall be edge coated to limit absorption and pick-up of moisture. OSB shall be equal to Georgia -Pacific Blue-Ribbon OSB.

2.4 Wood Treatment

A. Lumber in contact with concrete or masonry, including roof blocking, cants and nailers and/or as indicated, shall be pressure preservative treated in accordance with American Wood Preservers Institute Standard No. LP-2. Creosote, oil or similar materials which bleed shall not be used.

B. Lumber for blocking and furring, located within interior concealed spaces shall be non-combustible. Treatment shall be equal to "Flame-Proof" by Osmose Wood Preservative; "Non-Con" by Koppers or approved equal. Lumber shall be UL certification marked.

C. Pressure Treated wood associated with roof and roof edge construction which will be in contact with steel or galvanized steel components shall be wrapped or covered with Ice & Water Shield to prevent direct contact between pressure treated wood and steel.

2.5 Fastening Devices

Nails, screws, bolts, anchors, washers, clips, shields, power actuated devices and other rough hardware shall be of the sizes and types indicated on the drawings or as required to adequately anchor all members. Anchors for nailing strips and blocking shall have nuts and washers countersunk and bolts cut off flush with the top of the wood nailer. All fasteners in contact with pressured treated wood shall be galvanized.

2.6 Temporary Closures

Provide batten doors with locks at all exterior openings. Appropriate protection against weather and life safety shall be maintained throughout the job.

2.7 Blocking

Provide solid blocking at all grab bars, millwork cabinets and wall mounted units. Coordinate with Installer and/or Manufacturer.

2.8 Building Wrap - Provide building wrap over exterior surface of all exterior walls as recommended by manufacturer. Building Wrap shall be approved equal to Tyvek.

2.9 Air /Moisture Barrier - Provide building wrap over exterior surface of all exterior walls as recommended by manufacturer. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon Dupont Tyvek Commercial Wrap and related assembly components.

3.0 - EXECUTION

3.1 Installation

A. All work shall be installed plumb and true, and secured in place with proper fastenings so as to make rigid and firm.

B. The work of this section shall be performed in the best practice relating to the trade so as to carry out the intent of the drawings and to properly accommodate the work of all trades.

C. Cut ends or faces of all treated wood shall be brushed treated with preservative.

D. Wood Studs shall not exceed 16" o.c. Provide stud framing for walls to receive

ceramic tile at 12" o.c.

E. Plywood Roof Decking shall be installed with a 1/8" expansion gap between abutting sheets, all sides.

F. All Roof Deck fasteners shall be 100% within roof framing. Nails missing or by-passing structural rafter members shall be subject to correction.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Scope

A. The work under this section consists of all finish carpentry, millwork and related items.

B. Millwork shall be defined as follows: "All exterior and interior woodwork exposed to view in the finished building, except lumber yard or specialty items. All exposed wood, plywood, hard plastic and wood doors are included."

C. All millwork shall be produced by the same source of supply to coordinate matching of materials.

### 1.2 Submittals

A. Shop drawings shall be furnished on all millwork to the architect for approval prior to fabrication. These drawings to show size, arrangement, type of material, connections and relationship to adjacent work.

B. All shop drawings shall show species of woods and the manufacturer's name for all manufactured items.

C. When required, contractor shall submit a sample unit as requested.

D. Submit samples of decorative laminate colors, patterns, and textures for semi-exposed materials for architect's selection. Samples of other materials or hardware shall be available if requested.

### 1.3 Applicable Standards

A. The Quality Standards of the American Woodwork Institute (AWI) shall apply and, by reference, are made a part of this specification.

B. Millwork materials and workmanship not shown, specified, or normally furnished to a higher degree of quality shall conform to custom grade requirements of the AWI Quality Standards.

### 1.4 Delivery and Storage

A. When all millwork items are ready for shipment to the job site, the architect shall be notified through the contractor so that either may inspect the work in the mill prior to shipment.

B. All materials shall be inspected by the contractor's superintendent upon receipt at the job site. No faulty or damaged materials shall be received. It shall be the contractor's responsibility to produce finished items of work in first class condition.

C. No interior millwork shall be delivered until the building has been dried out. Heat shall be required in cold or humid weather.

D. No trim shall be delivered or placed until the areas of the building in which the trim is to be placed are thoroughly dry and ready for the installation. The building shall be enclosed and heated. Allow wood to acclimate for 7-10 days prior to installation.

## 2.0 - PRODUCTS

### 2.1 General

A. All materials shall be of the best of their respective kinds. All materials used in finished work shall be clear, free from cracks, checks, knots and other imperfections that may interfere with the proper completion of the work and any warped or otherwise imperfect work shall be removed and replaced.

B. All plywood shall have a grade-trademark which shall identify each panel of plywood as to type, grade and conformance to CS45 or CS122 (current issues). If use is exposed to weather or excessive moisture, plywood shall be of the exterior type. Exposed faces and faces to receive plastic laminates shall be "A" grade. Panels used for concealed cabinet parts may be C-D grade. Thickness and application details shall be as shown on drawings or required for the intended use.

### 2.2 Interior Woodwork

A. Lumber used for painted interior woodwork, unless otherwise indicated, shall be one of the following:

1. Fir - Coast or Inland Douglas White
2. Pine - Ponderosa, Southern
3. Redwood
4. Cypress
5. Yellow Poplar
6. Grade of lumber used shall be second grade for paint finish, except cypress may be third grade.

B. Hardwood: All references to hardwood shall imply stain grade oak.

C. All interior plywood to be painted shall be Natural Birch.

D. All interior woodwork and plywood to be stained or finished natural shall be Premium Grade Select White Birch or as specified on drawings. Veneer shall be rotary cut or as indicated on drawings or related specification sections. Semi-exposed parts, as defined by AWI, of natural or stained casework shall be Natural Birch.

E. Lumber shall be kiln dried with an average moisture content of 6% to 11%.

F. Particle board shall be U. S. Plywood Corp. "Novoply" Weyerhaeuser Company "Timblend", or approved equal of thickness shown. Factory sanded or sealed or filled, 2 sides.

### 2.3 Plastic Laminate

A. Plastic laminate shall be Nevamar, Wilson-Art, Formica, Laminart, Arborite, Pionite, 1/16" thick. See Finish Legend and Schedule for color selections.

B. Backing sheet shall be high pressure laminate, .020" minimum thickness. Plastic laminate to be used on all interior open shelves. Melamine is not acceptable unless it matches the selected plastic laminate.

C. The adhesive shall be that recommended by the manufacturer of the laminated plastic used.

D. Edging Materials:
1. 1mm PVC banding, machine applied; match laminate as scheduled.
2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius; match laminate as scheduled.

2.4 Rough Hardware
All exposed bolts or other anchors shall be chrome-plated brass.

2.5 Finish Hardware
Furnish and install all finish hardware for millwork items including, but not necessarily limited to, cabinet door and drawer pulls and latches, adjustable shelf standards and brackets, and hardware for doors less than 1-3/8" thick. Hardware finish shall match room door hardware finish.

2.6 Thickness of Members
All thicknesses shall be in accordance with the maximum possible dressed size from standard lumber. If widths or thicknesses are not available in hardwood, gluing may be used on widths over 5-1/4" or thicknesses over 1-1/6".

2.7 Workmanship
A. All exposed surfaces and edges shall be finished smooth and be free of saw cuts, marks or defacement. All joints shall be accurately and neatly made and fit.

B. End grain shall be concealed. Exposed edges of plywood shall present a finish the same as the finished sides.

C. Work shall be scribed and fit to other finished surfaces in a careful manner. Should other work be damaged or disturbed, it shall be made good at the expense of this contractor.

D. Work shall be assembled at the mill insofar as is practicable and delivered ready for erection. When necessary to cut and fit on job, the material shall be made up with ample allowance for cutting.

E. This contractor shall verify all measurements at the building and shall examine all adjoining work on which his work is dependent.

F. Millwork shall be executed in accordance with the approved shop drawings, the workmanship shall be of first quality and the construction of all parts shall be of the best current practice. The work shall be assembled so as to hold together with close joints, fastenings shall be concealed, and all work shall be properly and firmly backed and blocked as required. Provision shall be made for expansion and shrinkage.

G. Exposed surfaces shall be machine-sanded to an even, smooth surface, nails set, ready for finishing or pre-finishing when noted. All woodwork shall be dry, clean, and smooth before any finishing materials are applied. All nail holes, cuts, cracks and other defects shall be treated so as to be unnoticeable.

H. All wood surfaces to be set against masonry and/or concealed after erection shall be given a heavy coat of sealer. All woodwork to have paint finish shall be primed under the PAINTING SECTION.

I. All transparent finished (i.e., stained) woodwork shall be shop finished by Millwork

Contractor.

J. All caulking to match laminate or stain color.

K. All millwork/casework cabinets in contact with finish floor shall receive scheduled base.

2.8 Carpentry and Millwork Items

A. The following millwork items are intended to guide such work in this project and do not necessarily limit the scope of this section.

B. Where not otherwise specified, shelving, cabinet work and millwork of all types shall conform with requirements of Premium Grade of "Quality Standards of the Architectural Woodwork Industry" (Architectural Woodwork Institute).

C. Wood Base and Shoe Mould - Shall be as detailed on drawings. Base shoe mould lengths to be maximized wherever possible. Wood scraps and remnants used for base material is NOT acceptable. Minimum 8' lengths.

2.9 Materials and Construction

A. MDF (Medium Density Fiberboard)
Shall be equal to Premier7 MDF, Plus Grade. MDF is to be shop finished by Millwork Contractor with a transparent stain. The actual surface of the MDF is to be visible through the stain color. Stain colors are to match paint selections indicated on drawings. Millwork Contractor to provide stain samples to Architect for approval prior to fabrication.

B. Panels - End panels, shelves, bottoms and partitions of 3/4" Birch plywood, "Good" grade on all surfaces or plastic laminate covered particle board as approved. All other surfaces may be A grade fir plywood. All edges exposed to sight shall be self edged and sanded smooth and flush.

C. Doors - Construction of 3/4" Birch plywood, "Good" grade or plastic laminate covered particle board as approved. All edges shall be self edge.

D. Drawers - Front identical to doors above. Back minimum of 1/2" A-A Grade fir plywood. Sides of solid hardwood of sound grade. Bottoms of 1/4" plywood or 1/4" brown welded fiber board. Front and back connection shall be rigid type. Bottoms shall be let into front, back and sides approximately 1/4 of an inch. Drawer interiors to be Melamine.

E. Backs - Backs shall be a minimum of 1/4" plywood or 1/4" brown welded fiber board. Open to view 1/4" Birch plywood. All open-to-view backs are to receive plastic laminate.

F. Adjustable Shelves - 3/4" thick for maximum spans of 30". 1-1/8" thick for maximum spans of 42". All open-to-view shelves are to receive plastic laminate.

G. Cabinet Base – Cabinet Base and tall units shall have a site-built toe base constructed of 3/4-inch (minimum) lumber unless otherwise shown on the drawings. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings. Particle board is not acceptable.

H. Finishes – Tops, edges, and backsplashes and any other areas noted shall be plastic laminate covered.

I. Cabinet Hardware - Contractor shall furnish hardware equal to that as manufactured by Stanley, as hereinafter specified. All hardware to be Brushed Chrome, unless indicated otherwise on drawings.

Pull Handles -
4" wire pull, brushed chrome finish. Two pulls on drawers over 30" wide.

Drawer Guides -
Regular, knee space and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.

File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

Door Hinges - Five knuckle, epoxy powder coated, institutional grade, 2-3/4 inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1.
Doors 48 inches and over in height have 3 hinges per door.

Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.

1. Finish to be selected by Architect.

## 3.0 - EXECUTION

3.1 Shop Assembly

When it is possible, all items of millwork which can be carried into the building through doorways or windows shall be shop assembled. When it is impractical to shop assemble the entire item in one piece, it shall be shop assembled in sections and perfectly fitted in place on the job by thoroughly experienced and competent mechanics. Where job joining requires gluing, it shall be done by the same method used in the Shop.

3.2 Installation

A. All finish carpentry and millwork of every sort shall be put up plumb or level, and straight and true. Trim put up with proper grounds and firmly secured. All work fitted and scribed to other work in a careful manner as not to injure the surface in any way. All nailing shall be blind wherever possible, but where not possible, the nailing driven and set so as to be not visible in the finish.

B. All trim to be free from defects impairing durability or fitness for receiving finish. All trim properly sanded at mill and hand sanded at the job.

C. Finished surfaces of interior millwork, detailed or scheduled to be painted, shall be left ready for treatment by the painter. The jointing and framing of all members of the finished millwork shall be executed in accordance with the best and latest recognized mill practice.

D. This contractor shall cooperate with contractors for other trades with which his work comes in contact.

3.3 Finish Hardware

A. Install items of hardware furnished under FINISH HARDWARE SECTION.

B. Hardware shall be accurately fitted and securely attached, without damage to metal or woodwork, and care shall be taken to not mar or injure any work.

C. Hardware shall be protected as approved or removed for painting.

D. Upon completion of the work, hardware shall be demonstrated to work freely, keys shall be fitted into their respective locks and upon acceptance of the work, all keys shall be tagged and delivered to the Owner.

E. All open -to- view shelves are to receive heavy duty, double cleated adjustable standard hardware.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Section Includes

A. Surface preparation.

B. Application of a solvent type liquid applied dampproofing membrane.

**Note: This product shall not be installed until adjacent roof construction has been dried-in. CMU walls must be dry on both sides before application.**

### 1.2 Related Sections

A. Section 03300 - Cast-in-Place Concrete.

### 1.3 References

A. Spray or Brush-on dampproofing coating
   1. ASTM D4479-00 - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.

B. Trowel applied dampproofing coating
   1. ASTM D4586-00 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

### 1.4 Submittals

A. Comply with Section 01350 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

### 1.5 Delivery, Storage, and Handling

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Store at temperatures of 40°F (5°C) and above to facilitate handling.

D. Do not store at temperatures above 90°F (32°C) for extended periods.

E. Keep away from sparks and flames.

F. Protect materials during handling and application to prevent damage or contamination.

### 1.6 Environmental Requirements

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply membrane when air or surface temperatures are below 35°F (2°C).

C. Do not apply to frozen concrete.

D. Do not apply when rain is imminent.

## 2.0 - PRODUCTS

### 2.1 Manufacturer

A. W.R. Meadows, Inc or pre- approved manufacturer with similar solvent based products.

### 2.2 Materials

A. Spray applied solvent dampproofing should be an asbestos-free, non-fibered asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content.
   1. Spray-Mastic by W.R. Meadows.

B. Brush applied solvent dampproofing should be an asbestos-free, fibered, asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content. For use to protect exterior below-grade masonry walls.
   1. Semi-Mastic by W.R. Meadows.

C. Trowel applied solvent dampproofing should be a heavy bodied, asbestos-free fibered, asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content. For exterior below grade masonry wall surface application.
   1. Trowel-Mastic by W.R. Meadows.

### 2.3 Accessories

A. Waterproofing Protection Course: Protection Course.

B. Rolled Matrix Drainage System: Mel-Drain™ Rolled Matrix Drainage System.

## 3.0 - EXECUTION

### 3.1 Examination

A. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### 3.2 Surface Preparation

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Concrete surfaces must be clean, smooth and free of standing water.

E. Patch all holes and voids and smooth out any surface misalignments.

### 3.3 Application

A. Apply dampproofing in accordance with manufacturer's instructions.

B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

3.4 Protection

A. Protect membrane on vertical and horizontal applications with immediate application of protection course, if no drainage system is used, or rolled matrix drainage system.

B. Backfill within 24-48 hours using care to avoid damaging the dampproofing.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope
The work under this section consists of all building insulation except rigid roof insulation.

1.2 Submittals
Submit samples of all materials hereinafter specified for approval.

1.3 Protection
All thermal insulation shall be maintained dry throughout construction. Wet insulation shall be rejected.

## 2.0 - PRODUCTS

2.1 Material

A. Masonry Foam Fill Insulation shall be approved equal to:
1. Core Foam Masonry Foam Insulation by cfiFOAM.
2. Other Pre-approved manufacturers:
   a. Applegate C Foam Insulation by Applegate R Foam, Inc.
   b. Core-Fill 500 by Tailored Chemical Products, Inc.
3. Minimum Product Performance Standards
   a. Fire-Resistance Ratings: Foam shall neither add to nor detract from fire-resistance ratings of insulated fire-resistance rated CMU walls per prevailing building codes.
   b. Surface Burning Characteristics: Class A per ASTM E84; Flame Spread Index ≤ 25; Smoke Developed Index ≤ 450.
   c. Thermal Resistance: R-4.6/inch @ 75°F per either ASTM C518 or ASTM C177
   d. Potential Heat: ≤ 100 Btu/lb. when tested per NFPA 259 (ASTM D5865).
4. Installation Guidelines
   a. Fill all open cells and voids in hollow concrete masonry walls where shown on the drawings.
   b . The foam insulation shall be pressure injected through a series of 5/8" to 7/8" diameter holes drilled to access each column of block cells e.g. 8" o/c beginning approximately four (4) feet above the finished floor.
   c. Repeat this procedure at 10' to 16' intervals above the first horizontal row of holes (or as needed) until the empty core cells are completely filled.
   d. In walls where horizontal bond beams occur, repeat the procedure above the bond beams to assure insulating the entire wall.
   e. If "Hi-Flow" nozzles by cfiFOAM, Inc. are used, foam may be injected at up to twenty (20) foot vertical intervals.
   f. Patch holes with mortar and score to resemble adjacent surfaces. Insulation shall not be injected into wet walls.
5. Quality Assurance
   a. Manufacturing Standards; Provide insulation from a single approved source. Product components shall be of the same brand from the same approved source arriving at the site either pre-mixed according to the manufacturer's printed instructions or in

unopened factory sealed containers.

b. Installer Qualifications for Foamed-In-Place Masonry Insulation:
   1.) Engage an authorized contract installer who has been trained, authorized and equipped by the product manufacturer.

c. At the Architect's request, the Installer shall provide infrared scanned images of the work prepared by a "Block Wall Scan IR" or equivalent trained IR technician to confirm that empty core cells are filled with foam insulation.
   1.) Insulation voids shall be foamed at no added cost to the Owner.

B. Rigid thermal insulation shall be 1" thick by 16" wide for cavity walls and 24" wide if indicated for slabs. The insulating material shall have a minimum compressive strength of 25 psi and maximum water vapor transmission rate of 1.1 perm-inch and shall conform to ASTM C578, Type III-IV, R-value/inch @ 75 degrees F 5.0. Adhesive, in cavities, shall be equal to Styrofoam brand mastic #7 or #11 as distributed by Dow. All joints shall be taped.

C. Rigid thermal insulated sheathing shall be 3/4" thick x 48" wide foil faced vapor barrier material with minimum compressive strength of 25 psi and maximum water vapor transmission rate of .03 perm-inch.

D. Sound Attenuation Batt Insulation shall be 3-1/2" thick fiberglass insulation with a Noise Reduction coefficient of 1.05. Equal to Owens Corning.

E. Air/Vapor Barrier - Basis of Design: Spunbonded polyolefin, non-woven, non-perforated barrier equal to Dupont Tyvek Commercial Wrap, Class A and related assembly components. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations.
   1. Shall be allowed as a substitution and similar to FSK facing material. As such this material would be used in conjunction with unfaced insulation and shall be provided continuous and attached to applicable framing members. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations.

## 3.0 - EXECUTION

### 3.1 Installation

A. Masonry foam fill insulation shall be provided at all exterior wall assemblies and where indicated to thoroughly fill CMU cells and voids continuous from bottom to top of exterior and applicable masonry walls. Install in accordance with manufacturer's printed recommendations and procedures.

B. Rigid thermal insulation
   1. Walls - Adhere insulation to walls in a horizontal position, closely butted and with vertical joints staggered. Provide joint mastic and joint tape to the foam and apply in accordance with manufacturer's recommendations.

   2. Floor Slab - Lay insulation on vapor barrier butted end to end at full perimeter of exterior walls.

      Backfill against insulation with fill and gravel.

   3. During storage and insulation, observe good fire safety practices, including job site housekeeping.

   4. If adhesive is required, use mastic for bonding foam board to non-

absorbent surfaces such as dense concrete, metal, brick, glass, and paint.

C. Rigid thermal insulated sheathing shall be placed on stud system and secured in accordance with manufacturer's recommendations and specifications. (NOTE: Use 4 x 8 x 3/4" plywood sheathing at all corners and wall openings.)

D. Sound Attenuation Batt Insulation shall be placed on ceiling or stud system and secured and sealed in accordance with manufacturer's recommendations and specifications. Place around or over mechanical equipment rooms, toilet rooms, window in-fill spaces, and other areas as indicated.

E. Mesh, shall be provided for supporting overhead horizontal insulation and attached to applicable framing members as required, not to exceed 16" o.c. Mesh material shall be provided to maximize width as project conditions permit. Mesh fabric shall be steel wire type with nominal 2" grid. Continuous metal straps at 16" o.c. shall be an acceptable substitute.

F. Air/Vapor Barrier - Shall be allowed as a substitution and similar to FSK facing material. As such this material would be used in conjunction with unfaced insulation and shall be provided continuous and attached to applicable framing members. All seams, edges and penetrations shall be taped and sealed per manufacturer's recommendations. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated barrier equal to Dupont Tyvek Commercial Wrap, Class A and related assembly components.

END OF SECTION

# 1.0 - GENERAL

## 1.1 Summary

A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls

B. Related Sections

Section 07610: Standing Seam Roof

Section 07910: Caulking and Sealants

## 1.2 Submittals

A. Manufacturer's specifications, details, installation instructions and product data

B. Manufacturer's code compliance report

C. Manufacturer's standard warranty

D. Applicator's industry training credentials

E. Samples for approval as directed by architect or owner

F. Sealant manufacturer's certificate of compliance with ASTM C 1382

G. Prepare and submit project-specific details (when required by contract documents)

## 1.3 References

A. ASTM Standards:

- B 117 Test Method for Salt Spray (Fog) Testing
- C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
- C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
- C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
- C 1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
- D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
- D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
- D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
- D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- D 3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 96 Test Methods for Water Vapor Transmission of Materials
- E 119 Method for Fire Tests of Building Construction and Materials
- E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 1233 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference

E 2098 Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)
E 2178 Test Method for Air Permeance of Building Materials
E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
E 2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
E 2570 Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
G 153 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

B. Building Code Standards
AC 235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November, 2009)

C. National Fire Protection Association (NFPA) Standards
1. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
2. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus

D. Other Referenced Documents
1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
2. APA Engineered Wood Association E 30, Engineered Wood Construction Guide
3. ICC-ES ESR-1233, StoGuard with Gold Coat, StoGuard with Emerald Coat, and StoGuard Vapor Seal Water-Resistive Barriers and StoEnergy Guard
4. ICC-ES ESR-1748, StoTherm® NExT®

1.4 Design Requirements

A. Wind Load
1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
2. Design for wind load in conformance with code requirements.
3. Maximum wind load resistance: ± 188 psf (9.00 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.

B. Moisture Control
1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:

a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.

b. Air Leakage Prevention – provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.

c. Vapor Diffusion and Condensation – perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

C. Impact Resistance

Provide ultra-high impact resistance of the EIFS to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than "Standard" on contract drawings.

D. Color Selection

Select finish coat with a light reflectance value of 20 or greater. Architect to select from full range of colors.

E. Joints

1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.

F. Grade Condition

Provide minimum 6 inch (152 mm) clearance above grade or as required by code.

G. Trim, Projecting Architectural Features and Reveals

1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum ¾ inch (19 mm) insulation thickness at the bottom of the reveal. All horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface. Where trim/feature or bottom surface of reveal projects more than 2 inches (51 mm) from the face of the EIFS wall plane, protect the top surface with

waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance.

2. Do not use the EIFS on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing.

H. Insulation Thickness
1. Minimum EPS insulation thickness is 1 inch (25 mm).
2. Maximum EPS insulation thickness is 12 inches (305 mm), except as noted below for fire-resistance rated wall assemblies.

I. Fire Protection
1. Do not use EPS foam plastic in excess of 12 inches (305 mm) thick on types I, II, III, or IV construction unless approved by the code official.
2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use over rated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable EPS thickness: 4 inches (102 mm).
3. Refer to manufacturer's testing or applicable code compliance report for other limitations that may apply.

1.5 Performance Requirements

A. Comply with ASTM E 2568, ASTM E 2570, and the following:

Table 1 Air/Moisture Barrier Performance

| TEST | METHOD | CRITERIA | RESULT |
|---|---|---|---|
| 1. Water Penetration Resistance | AATCC 127 (Water Column) | Resist 21.6 in (55 cm) water for 5 hours before and after aging | Pass |
| 2. Water Penetration Resistance after Cyclic Wind Loading | ASTM E 1233 / ASTM E 331 | No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) differential | No water penetration |
| 3. Water Resistance Testing | ASTM D 2247 | Absence of deleterious effects after 14 day exposure | No deleterious effects |
| 4. Water Vapor Transmission | ASTM E 96 Method B (Water Method) | Measure | Sto Gold Fill®*: 7.10 perms [408 ng/(Pa·s·m²)] Sto Gold Coat: > 10 perms [574 ng/(Pa·s·m²)] |
| 5. Air Leakage (material) | ASTM E 2178 | ≤ 0.004 cfm/ft2 at 1.57 psf (0.02 L/s•m2 at 75 Pa) | Pass |
| 6. Air Leakage (assembly) | ASTM E 2357 | ≤ 0.04 cfm/ft2 (0.2 L/s•m2) | Pass |
| 7. Structural Integrity | ASTM E 330 | 2-inches (51 mm) $H_2O$ pressure (positive & negative) for 1 hour. | Pass |

| TEST | METHOD | CRITERIA | RESULT |
|---|---|---|---|
| 8. Dry Tensile Strength | ASTM D 882 | 20 lbs/in (3503 N/m), minimum before and after aging | Sto Gold Fill:* 159 lbs/in (27845 N/m)) before aging 213 lbs/in (37302 N/m) after aging |
| 9. Pliability | ASTM D 522 | No Cracking or Delamination using ⅛" (3 mm) mandrel at 14°F (-10°C) before and after aging | Pass |
| 10. Surface Burning | ASTM E 84 | Flame Spread 0 – 25 for NFPA Class A, UBC Class I | Flame Spread: 5 Smoke Density: 10 |
| 11. Tensile Adhesion | ASTM C 297 | >15 psi (103 kPa) | >30 psi (207 kPa) to Plywood, OSB, Glass Mat Faced Gypsum sheathings |

* Note: Sto Gold Fill testing with Sto Detail Mesh reinforcement

Table 2 EIFS Weather Resistance and Durability Performance*

| TEST | METHOD | CRITERIA | RESULTS |
|---|---|---|---|
| 1. Accelerated Weathering | ASTM G 153 (Formerly ASTM G 23) | No deleterious effects* at 2000 hours when viewed under 5x magnification | Pass |
| 2. Accelerated Weathering | ASTM G 154 (Formerly ASTM G 53) | No deleterious effects* at 2000 hours | Pass |
| 3. Freeze/Thaw Resistance | ASTM E 2485 | No deleterious effects* at 10 cycles when viewed under 5x magnification | Pass |
| 4. Water Penetration | ASTM E 331 (modified per ICC-ES AC 235) | No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes at 6.24 psf (299 Pa) or 20% of design wind pressure, whichever is greater | Pass at 12.0 psf (575 Pa) after 30 minutes |
| 5. Drainage Efficiency | ASTM E 2273 | 90% minimum | > 90% |
| 6. Tensile Adhesion | ASTM E 2134 | Minimum 15 psi (103kPa) tensile strength | Pass |
| 7. Water Resistance | ASTM D 2247 | No deleterious effects*at 14 day exposure | Pass @ 28 days |
| 8. Salt Spray | ASTM B 117 | No deleterious effects* at 300 hours | Pass @ 300 hrs |
| 9. Abrasion Resistance | ASTM D 968 | No cracking or loss of film integrity at 528 quarts (500 L) of sand | Pass @ 528 quarts (1000 L) |
| 10. Mildew Resistance | ASTM D 3273 | No growth supported during 28 day exposure period | Pass @ 28 days |

| TEST | METHOD | CRITERIA | RESULTS |
|---|---|---|---|
| 11. Impact Resistance | ASTM E 2486 | Level 1: 25-49 in-lbs (2.83-5.54J)<br>Level 2: 50-89 in-lbs (5.65-10.1J)<br>Level 3: 90-150 in-lbs (10.2-17J)<br>Level 4: >150 in-lbs (>17J) | Pass with one layer Sto Mesh<br>Pass with two layers Sto Mesh<br>Pass with one layer Sto Intermediate Mesh<br>Pass with one layer Sto Armor Mat and one layer Sto Mesh |

* No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3 Air/Moisture Barrier and EIFS Fire Performance

| TEST | METHOD | CRITERIA | RESULT |
|---|---|---|---|
| 1. Fire Endurance | ASTM E 119 | Maintain fire resistance of existing rated assembly | Pass (4 inch [102 mm] maximum allowable insulation thickness) |
| 2. Intermediate Scale Multi-Story Fire Test | NFPA 285 (formerly UBC Standard 26-9) | 1. Resistance to vertical spread of flame within the core of the panel from one story to the next<br>2. Resistance to flame propagation over the exterior surface<br>3. Resistance to vertical spread of flame over the interior surface from one story to the next<br>4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces | Pass with 12 inches (305 mm) insulation |
| 3. Radiant Heat Ignition | NFPA 268 | No ignition @ 20 minutes | Pass with 1 and 12 inches (25 and 305 mm) insulation |
| 4.Surface Burning (individual components) | ASTM E 84 | Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less | Flame Spread: < 25<br>Smoke Developed: < 450 |

Table 4 EIFS Component Performance

| TEST | METHOD | CRITERIA | RESULT |
|---|---|---|---|
| 1. Alkali Resistance of Reinforcing Mesh | ASTM E 2098 | Greater than 120 pli (21 dN/cm) retained tensile strength | Pass |
| 2. Requirements for Rigid PVC Accessories | ASTM D 1784 | Meets cell classification 13244C | Pass |

1.6 Quality Assurance

A. Manufacturer Requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA)

2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years
3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System

B. Contractor Requirements
1. Engaged in application of similar systems for a minimum of three (3) years
2. Knowledgeable in the proper use and handling of Sto materials
3. Employ skilled mechanics who are experienced and knowledgeable in air/moisture barrier and EIFS application, and familiar with the requirements of the specified work
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications

C. Insulation Board Manufacturer Requirements
1. EPS board listed by an approved agency
2. EPS board manufactured under Sto licensing agreement and recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements
3. EPS board labeled with information required by Sto, the approved listing agency, and the applicable building code.

D. Mock-up Testing
Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.

E. Inspections
1. Provide independent third party inspection where required by code or contract documents
2. Conduct inspections in accordance with code requirements and contract documents

1.7 Delivery, Storage And Handling
A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product

B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.8 Project/Site Conditions
A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)

C. Provide protection of surrounding areas and adjacent surfaces from application of products

1.9 Coordination/Scheduling

A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by code

B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier

C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall

D. Install window and door head flashing immediately after windows and doors are installed

E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior

F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior

G. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface

H. Schedule work such that air/moisture barrier is exposed to weather no longer than 30 days

I. Attach penetrations through the EIFS to structural support and provide water tight seal at penetrations

1.10 Warranty

Provide manufacturer's standard warranty.

2.0 - PRODUCTS

2.1 Manufacturers

A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier

B. The following are acceptable manufacturers: (Basis of Design)
Sto Corp. – Air/Moisture Barrier, EIFS
Plastic Components, Inc. – EIFS Accessories

C. Other manufacturers shall submit product data to Architect at least 10 days prior to bid. Comply with Section 01360 - Product Substitution. Acceptance will be in writing via Addendum.

2.2 Air/Moisture Barrier

A. Joint Treatment, Rough Opening Protection, and Detail Components:

1. One component rapid drying gun-applied rough opening protection for frame and CMU walls without mesh or fabric reinforcement. Also use as a joint treatment for sheathing when used with Mesh. Also used to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in air barrier materials

B. Waterproof Coating: – ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing

C. Transition Membrane:– flexible air barrier membrane for continuity at transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions, floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.

2.3 Adhesive

A. Factory blended one-component polymer-modified portland cement based high build adhesive

2.4 Insulation Board

A. EPS Insulation Board: nominal 1.0 lb/ft$^3$ (16 kg/m$^3$) Expanded Polystyrene (EPS) insulation board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements and listed, labeled, and furnished in accordance with this specification.

2.5 Base Coat

A. Waterproof Base Coat

Sto Flexyl – fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat over Sto BTS Plus or BTS Xtra for foundations, parapets, splash areas, trim and other projecting architectural features)

2.6 Reinforcing Meshes

A. Standard Mesh - nominal 4.5 oz/yd$^2$ (153 g/m$^2$), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials

2.7 Primer

A. Acrylic based tintable primer with sand for roller application

2.8 Finish Coat

Stolit® Lotusan® – acrylic based textured wall finish with graded marble aggregate and self-cleaning properties

2.9 Job Mixed Ingredients

A. Water – clean and potable

B. Portland cement – Type I, Type II, or Type I-II in conformance with ASTM C 150

2.10 Accessories

A. Starter Track – rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, FL 33178 (800 327 – 7077).

B. Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.

C. Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.11 Mixing

A. Sto Gold Fill – mix with a clean, rust-free high speed mixer to a uniform consistency

B. Sto Gold Coat – mix with a clean, rust-free high speed mixer to a uniform consistency

C. Sto BTS Plus – mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 47 pound (21.3 kg) bag of Sto BTS Plus. Pour water into a clean mixing pail. Add Sto BTS Plus, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Plus or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum water amount in mix ratio.

D. Sto Flexyl – mix ratio with portland cement: 1:1 ratio by weight. Pour Sto Flexyl into a clean mixing pail. Add portland cement, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary with additional Sto Flexyl and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

E. Watertight Coat – pour liquid component into a clean mixing pail. Add dry component, mix to a uniform consistency and allow to set for approximately five minutes. Adjust mix if necessary and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent.

F. Primer – mix with a clean, rust-free high speed mixer to a uniform consistency

G. Stolit Lotusan – mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.

H. Mix only as much material as can readily be used.

I. Do not use anti-freeze compounds or other additives

3.0 - EXECUTION

3.1 Acceptable Installers

A. Must conform to Quality Assurance requirements of this specification.

3.2 Examination

A. Inspect concrete and masonry substrates prior to start of application for:

1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances
2. Surface absorption and chalkiness
3. Cracks—measure crack width and record location of cracks
4. Damage and deterioration such as voids, honeycombs and spalls

5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage

6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane)

B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:

1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177

2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E 30

3. Cementitious sheathing – consult manufacturer

4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional

5. Fasteners seated flush with sheathing surface and not over-driven

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 Surface Preparation

A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces

B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances

C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness

D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material

E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement

F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)

G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing.

3.4 Installation

A. Air/Moisture Barrier Installation over Exterior or Exposure I Wood-Based Sheathing (Plywood and OSB), Glass Mat Faced Gypsum Sheathing in Compliance with ASTM C 1177, and Concrete, or Concrete Masonry (CMU) Wall Construction

1. Transition Detailing with Transition Membrane:
   At floor line deflection joints up to 1 inch (25 mm) wide, and static joints and transitions such as: sheathing to foundation, dissimilar materials (i.e., CMU to frame wall), flashing shingle-lap transitions, and wall to balcony floor slab or ceiling:
   a. Apply waterproof coating (Sto Gold Coat) liberally to properly prepared surfaces with brush, roller, or spray.
   b. Place pre-cut lengths of Transition Membrane centered over the transition in the wet coating. At changes in plane crease the membrane and similarly place the membrane material in the wet coating. At floor line deflection joints achieve a slightly concave profile (recessed into the joint) of the membrane.
   c. Immediately top coat the membrane with additional coating and apply pressure with brush or roller to fully embed the membrane in the coating and achieve a smooth and wrinkle-free surface without gaps or voids.
   d. Apply coating liberally along all top horizontal edges on walls and along all edges on balcony floor slabs to fully seal the edges.
   e. Overlap minimum 2 inches (51 mm) at ends and adhere lap seams together with coating. Shingle lap vertical seams and vertical to horizontal intersections with minimum 2 inch (51 mm) overlap.

B. At movement joints up to 1 inch (25 mm) wide with up to + 50% movement such as masonry control joints, and through wall joints in masonry or frame construction:
   1. Insert backer rod sized to friction fit in the joint (diameter 25% greater than joint width).
   2. Recess the backer rod ½ inch (13 mm).
   3. Apply the waterproof coating liberally to properly prepared surfaces with brush, roller, or spray along the outer surface on each side of the joint (not in the joint).
   4. Immediately place the membrane by looping it into the joint against the backer rod surface to provide slack.
   5. Embed the membrane in the wet coating along the outer surface on the sides of the joint by top coating with additional coating material and applying pressure with a brush or roller.

C. For all applications, after the membrane installation is complete and the waterproof coating is dry:
   1. Apply a final liberal coat of the waterproof coating to all top horizontal edges on walls to ensure waterproofing integrity. Similarly apply coating at all edges on balcony floor slabs.
   2. Inspect the installed membrane for fish mouths, wrinkles, gaps, holes or other deficiencies. Correct fish mouths or wrinkles by cutting, then embedding the area with additional coating applied under and over the membrane.
   3. Seal gaps, holes, and complex geometries at three dimensional corners with StoGuard, RapidFill or StoGuard RapidSeal.

D. Transition Detailing with StoGuard RapidFill
At flashing shingle laps, and through wall penetrations such as pipes, electrical boxes, and scupper penetrations:
1. Flashing leg or penetration flange must be seated flat against the wall surface without gaps. Apply StoGuard RapidFill liberally with a caulking gun in a zig-zag pattern across the flashing leg or flange/wall surface seam and spread to a thickness that covers the flange and fastener penetrations and directs water away from the wall. Extend application minimum 1 inch (25 mm) onto both surfaces (flashing leg/flange and wall surface).
2. At through wall penetrations without flanges ensure the penetrating element (i.e., pipe or scupper) is fitted snug against abutting wall surfaces. Apply a fillet bead with a caulking gun around the penetration and tool against both surfaces (penetration and wall surface) to create a bead profile that directs water away from the penetration. Extend application minimum 1 inch (25 mm) onto both surfaces.

E. Rough Opening Protection
1. Apply a generous bead of sealant with a caulking gun in a zig-zag pattern along the inside and outside surface of the rough opening. 2. Spread with a 6 inch (152 mm) wide plastic drywall knife all the way around the opening.

F. Sheathing Joint Treatment
1. Fill with Mesh: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread with a trowel to create a smooth surface that completely covers the mesh.

G. Air/Moisture Barrier Coating Installation
1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat. Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
2. OSB Sheathing: apply waterproof coating by spray or with a ¾ inch (19 mm) nap roller to sheathing surface to a uniform wet mil thickness of 10 mils. Protect rough openings, joints, and parapets (Paragraph 3.04D), then apply a second coat of waterproof coating.
3. CMU Surfaces:
   a. Repair static cracks up to 1/2 inch (13 mm) wide with StoGuard RapidFill. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth. Protect repair from weather until dry.
   b. Liberally apply two coats of Sto Gold Coat to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils each, depending on surface condition. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.

H. Air /Moisture Barrier Connections and Shingle Laps
1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at

sources of leaks (windows, doors and similar penetrations through the wall assembly).

3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.5 EIFS Installation

A. Starter Track

1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
2. Attach the starter track even with the line into structural supports with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) and three thread penetration, galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration, and corrosion resistant concrete or masonry screws with minimum 1 inch (25 mm) penetration for concrete or CMU. Attach between studs into blocking as needed to secure the track flat against the wall surface. Attach at maximum 16 inches (406 mm) on center into framing. For solid wood sheathing or concrete/masonry surfaces, attach directly at 12 inches (305 mm) on center maximum.
3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.
4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing (refer to Sto Details).

B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors

Starter Track, Window/Door Head Flashing, Floor Line Flashing, and Roof/Side Wall Step Flashing: Install minimum 4 inch (100 mm) wide detail component over back flange of starter track, floor line flashing, head flashing, and roof/side wall step flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.

C. Backwrapping

Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed (paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.

D. Adhesive Application and Installation of Insulation Board

Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination.

1. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
2. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. *(Note: rasping prevents an outward bow at the Starter Track).*

3. Use either polyurethane spray foam adhesive or cementitous adhesive: Cementitious Adhesive : apply adhesive to the back of the insulation board with the proper size (1/2 x ½ x 2 inch [13 x 13 x 51 mm]) stainless steel notched trowel. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive uniformly so ribbons of adhesive do not converge. Immediately place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply firm pressure over the entire surface of the boards to ensure uniform contact of adhesive. IMPORTANT: do not delay installation once adhesive is applied. If adhesive "skins" remove it and apply fresh adhesive.
4. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
5. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
6. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
7. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the spray foam adhesive dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.

E. Slivering and Rasping of Insulation Board Surface
1. Make sure insulation boards are fully adhered to the substrate before proceeding.
2. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
3. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

F. Trim, Reveals and Projecting Aesthetic Features
1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
4. Do not locate reveals/aesthetic grooves at high stress areas.
5. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.

G. Completion of Backwrapping
Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.

H. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh "tail" from one piece onto the next piece. Fully embed the accessory and mesh "tail" in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.
2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 I5 below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

I. Base Coat and Reinforcing Mesh Application
1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately ⅛ inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh

not less than 2-½ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above).Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.

6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-½ inches (65 mm).
7. Allow base coat to thoroughly dry before applying primer or finish.

J. Primer Application
1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.

K. Finish Coat Application
1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
   a. Avoid application in direct sunlight.
   b. Apply finish in a continuous application, and work to an architectural break in the wall.
   c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
   d. Do not install separate batches of finish side-by-side.
   e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
   f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.6 Protection

A. Provide protection of installed materials from water infiltration into or behind them

B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

3.7 Cleaning, Repair And Maintenance

A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly

END OF SECTION

## 1.0 - GENERAL

### 1.1 Summary

A. Section includes: Factory-formed metal panels, including flashing and accessories.
Metal panel includes: Wall Panels

B. Related Sections: Section(s) related to this section include:
1. Flashing and Trim: Division 7 Flashing and Sheet Metal Section.
2. Sealants: Division 7 Joint Sealers Sections.

### 1.2 References

A. American Society for Testing and Materials (ASTM):

B. Underwriters Laboratories (UL Classified Tests):

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
1. SMACNA Architectural Sheet Metal Manual

### 1.3 System Description

A. Performance Requirements: Provide sheet metal wall panels that have been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, failure of infiltration of water.
1. Wind-Uplift: Wall panel assembly shall comply with UL Classification 580 for UL Classified 90 rated assemblies
2. Static Air Infiltration: Completed wall system shall have a maximum of .06 cfm/sf with 6.24 kPa air pressure differential as per ASTM E283/1680.
3. Water Infiltration: No evidence of water penetration at an inward static air pressure differential of not less than 6.24 psf (43 kPa) and not more than 12.0 psf (83 kPa) as per ASTM E331/1646.

### 1.4 Submittals

A. General: Submit listed submittals in accordance with *Conditions of the Contract* and Division 1 Submittal Procedures Section.
1. Product Data: Submit product data, including manufacturer's specification data product sheet, for specified products.

B. Shop Drawings:
1. Submit complete shop drawings and erection details, approved by the metal panel manufacturer, to the architect for review. Do not proceed with manufacturer of wall panel materials prior to review of shop drawings and field verification of all dimensions. Do not use drawings prepared by the architect for shop or erection drawings.
2. Shop drawings show elevations, methods of erection, and flashing details.

C. Performance Tests:
1. Submit certified test results by a recognized testing laboratory in accordance with specified test methods for each panel system.

D. Samples: Submit selection and verification samples for finishes, colors and textures.

E. Quality Assurance Submittals: Submit the following:
   1. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.

   2. Manufacturer's Instructions: Manufacturer's installation instructions.

F. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Date: Operation and maintenance date for installed products in accordance with Division 1 Closeout Submittals, Maintenance Data and Operation Data Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Project Warranty: Warranty documents specified herein.
   3. Manufactures warranty: Submit, for owners acceptance, manufacturer's 20-year non-prorated warranty covering a PAC-CLAD finish, including color, fade, chalking and film integrity. Manufacturer's warranty is in addition to and not limited of, other rights the owner may have under the contract documents.

      Warranty Period: 20 years commencing on Date of Substantial Completion.

   4. Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout Submittals, Project Record Documents Section.

1.5 Quality Assurance

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in the installation of work similar to that required for this project.

B. Sheet Metal Industry Standard: Comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) *Architectural Sheet Metal Manual.*

C. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, Manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Coordination, Project Meetings Section.

1.6 Delivery, Storage and Handling

A. General: Comply with Division 1 Product Requirements Sections.
   1. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Identify fabricated components with UL 90 Classified label where appropriate.

C. Storage and Protection: Store materials protected from exposure to harmful conditions. Store material in dry, above ground location.
   1. Stack prefinished material to prevent twisting, bending, abrasion, scratching and denting. Elevate one end of each skid to allow for moisture to run off.
   2. Prevent contact with material that may cause corrosion, discoloration or staining.
   3. Do not expose to direct sunlight or extreme heat trim material with factory applied strippable film.

1.7 Project Conditions

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.8 Warranty

A. Project Warranty: Refer to *Conditions of the Contract* for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's 20-year nonprorated warranty covering PAC-CLAD finish, including color, fade, chalking and Film integrity executed by authorized company official. Manufacturer's warranty is in addition to and not a limitation of, other rights Owner may have under the Contract Documents.

Warranty Period: 20 years commencing on Date of Substantial Completion.

## 2.0 - PRODUCTS

2.1 Sheet Metal Wall Panels

A. Manufacturer: Petersen Aluminum Corporation or other manufacturers as submitted and prior approved to meet specifications. Comply with Section 01360 – Product Substitutions.

B. Wall Panels:
   1. Type: Reveal Panel
   2. Material: 24 ga G-90 Hot dipped Galvanized Steel
   3. Panel Dimension: 18 in. o.c.
   4. Texture: Smooth

C. Panel Finish:
   1. Panel Topside: PAC-CLAD finish color selected from Petersen Aluminum Corp. standard colors: To be selected by Architect.
   2. Panel Underside: Polyester washcoat with dry film thickness of 0.3 mils.

D. Flashing and Trim: Manufacturer's standard flashing and trim profiles, factory formed, gauge as recommended by manufacturer, color and finish to match metal wall panels.

2.2 Related Materials

A. General: Coordinate use of related materials.

2.3 Fabrication

A. General:
1. Continuous Length: Fabricate panels 55' (16.2 m) and less in one continuous length.
2. Trim and Flashings: Fabricate trim and flashings from same material as wall Panel system material.
3. Portable Roll Former: Panels fabricated by portable roll former shall not be approved.

2.4 Finishes

A. Factory Applied Finish:
1. Topside: Full-strength fluoropolymer (70% Kynar® 500 or Hylar® resin) system of 1.0 mil (.025 mm) total dry film thickness.
2. Underside: Wash coat of 0.3 - 0.4 mil dry film thickness.
3. Texture: Smooth texture, dull matte specular gloss 25 - 35% at 60°
4. Protective film: Strippable vinyl film applied during panel fabrication and finishing.

3.0 - EXECUTION

3.1 Manufacturer's Instructions

A. Compliance: Comply with manufacturer's product data, recommendations and installations instructions for substrate verification, preparation requirements and installation.
1. Strippable Film: Remove manufacturer's protective film, if any, from surfaces of wall panels.

3.2 Examination

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for project installation in accordance with manufacturer's instructions.

3.3 Preparation

A. Coordination: Coordinate metal wall panels with other Work (drainage, flashing and trim, copings, walls) and other adjoining work to provide a non-corrosive and leak-proof installation.

B. Dissimilar Metals: Prevent galvanic action of dissimilar metals.

3.4 Installation

A. General: Install metal wall panels to profiles, patterns and drainage indicated and required for leak-proof installation. Provide for structural and thermal movement at work. Seal joints for leak-proof installation.
1. Seams: Provide uniform, neat seams.
2. Fasteners: Conceal fasteners where possible in exposed work.

Cover and seal fasteners and anchors for watertight and leak-proof installation.

3. Sealant-Type Joints: Provide sealant-type joint where indicated. Form joints to conceal sealant. Comply with Division 7 Joint Sealants Section for Sealant installation.

3.5 Field Quality Requirements

A. Manufacturer's Field Services: Use recommendations and inspection of product installation in accordance with manufacturer's instructions.

3.6 Cleaning

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.7 Protection

A. Protection: Protect installed product from damage during construction.

END OF SECTION

SECTION 07540 – THERMOPLASTIC POLYOLEFIN (TPO) ROOFING SYSTEM

## 1.0 - GENERAL

### 1.1 Description

A. The work of this section consists of providing TPO Adhered Roofing System as outlined below:
   1. Apply the Adhered Roofing System in conjunction with the indicated roof Insulation.

### 1.2 Scope Of Work

A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of the .060" thick minimum (white, gray or tan color as selected by Architect) reinforced TPO (Thermoplastic Polyolefin) reinforced membrane Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details to meet performance criteria specified herein.

B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.

C. The roofing contractor shall confirm all given information and advise the Architect, prior to bid, of any conflicts that will affect their cost proposal.

D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturers must submit for pre-approval in writing ten (10) days prior to the bid date. Comply and submit in accordance with Section 01360.

### 1.3 Related Sections

A. Section 07621 – Sheet Metal Work Flashing and Trim

B. Section 10428 – Roof Information Plaque

### 1.4 Submittals

A. Prior to starting work, the roofing contractor must submit the following:

   1. Shop drawings showing layout, details of construction and identification of materials.
   2. A sample of the manufacturer's Membrane System Warranty.
   3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
   4. Attachment pattern for insulation and membrane to comply with wind zone requirements.

B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the Architect prior to the issuance of the manufacturer's warranty.

C. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with performance requirements specified in "Performance Requirements" Article.
   1. Submit evidence of meeting performance requirements.
   2. Submit signed approval of project drawings and specifications meeting manufacturer's requirements for specified manufacturer's warranties.
   3. Submit evidence of Installer/contractor meeting requirements for specified warranties.
   4. Contractor to register roofing project with the manufacturer prior to the pre-roofing conference and prior to submitting shop drawings. As part of the submittals package, copy of the acknowledgement of the manufacturer is required.

**Note: Copy of Acknowledgement Letter from manufacturer that project has been registered shall be included with submittals and prior to pre-roofing conference.**

A **minimum** of three (3) field inspections shall be made by a technical (non-sales) representative of the Roofing System Manufacturer at start, mid-way and upon completion of the work. Written reports shall be made and copies of these reports must be submitted to the Architect within 3 days of the inspections. These inspections must be made by a manufacturer's representative employed by the manufacturer. Notify Architect 72 hours prior to inspections.

1.5 Product Delivery, Storage and Handling

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.

B. Comply with the manufacturer's written instructions for proper material storage.

   1. Store membrane in the original undisturbed plastic wrap in a cool, shaded area. Membrane that has been exposed to the elements for approximately 7 days must be prepared with Commercial Innovations Weathered Membrane Cleaner (or other Manufacturer's recommended product) prior to hot air welding.
   2. Store curable materials (adhesives and sealants) between 60F and 80F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60F minimum temperature before using.
   3. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.

C. Insulation must be on pallets, off the ground and tightly covered with waterproof protective materials.

D. Any materials which are found to be damaged shall be removed and replaced at the contractor's expense.

1.6 Work Sequence

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections

of the membrane system.

B. Do not disrupt activities in occupied spaces.

1.7 Site Conditions

A. If discrepancies are discovered between the actual conditions and those noted on the drawings, immediately notify the Architect in writing. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.8 Pre-Roofing Conference

A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of roofing system installation and associated work.

**Require attendance of installer of each component of associated roofing work, Contractor, Architect, Owner, Alabama Construction Management, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:**

1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
2. Review roofing system requirements (drawings, specifications and other contract documents).
3. Review required submittals both completed and yet to be completed.
4. Review construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
5. Review required inspection, testing, certifying and material usage accounting procedures.
6. Discuss weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
7. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.

B. The Architect will record the proceedings and distribute them to the participants for record.

C. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner and Architect.

**D. The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is**

**not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.**

1.9 Job Site Protection

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application. **Do not store roofing materials on the roof.**

B. During the roofing contractor's performance of the work, the owner will continue to occupy the existing adjacent building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary, temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.

C. Do not overload any portion of the building, by either use of or placement of equipment, storage of debris, or storage of materials.

D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.

E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.

F. Store moisture susceptible materials above ground and protect with waterproof coverings.

G. Remove all traces of piled bulk material and return the job site to its original condition upon completion of the work.

1.10 Safety

A. The contractor shall be fully responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the contractor. All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, workers and the occurrence of the general public on or near the site.

1.11 Workmanship

A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.

B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the Owner's satisfaction.

C. There shall be a supervisor on the job site at all times while work is in progress.

D. The contractor shall be responsible for weathertightness under this section.

1.12 Quality Assurance and Performance Requirements

A. The membrane roofing system must achieve a UL Class A and FM1-90 or higher rating. (No exceptions). Provide additional materials or higher quality to meet FM-I-90 and wind speed requirements of 130 mph or higher (Risk Category 3) and Severe Hail (SH) requirements. (No exclusions for hail less than 2")

B. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

C. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer.

D. All roofing materials shall be new and provided by same source as required to comply with manufacturer's system warranty.

E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified including operation of hot air welding equipment and power supply. Provide at least one thoroughly trained and an experienced superintendent on the job at all times roofing work is in progress.

F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the Architect. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the Architect's consideration.

G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the Architect seventy-two (72) hours prior to the manufacturer's final inspection.

H. FMG Listing: Provide roofing membrane, base flashings, and component materials that meet the requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: UL Class A – FM 1-90 (130 mph wind speed minimum) Risk Category 3
2. Hail Resistance: Severe Hail (SH) (No exclusions for 2" hail)

I. Membrane Roofing System must meet or exceed impact resistance requirements of IBC 2021 Section 1504.7 and Wind Speed Requirements as applicable to the Zone where the Building is located as required by the IBC 2021Edition.

J. Certification of Roofing System
Contractor(s), Roofing Material Manufacturer, and Roofing Material Manufacturer's Field Inspector shall each execute the Certification of Roofing

System, a copy of which immediately follows this Section.

K. Product must meet Testing requirements of ASTM D5019, "Standard Specification for Reinforced Non-Vulcanized Polymeric Sheet Used in Roofing Membrane"

1.13 Job Conditions and Special Handling

A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.

B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.

C. When loading materials onto the roof, the Authorized Roofing Applicator must comply with the requirements of the Owner/Architect to prevent overloading and possible disturbance to the building structure.

D. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.

E. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.

F. Provide protection, such as 3/4-inch-thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters. Remove debris and loose fasteners promptly.

G. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.

H. New roofing installation shall be complete and weather tight at the end of each work day.

I. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.14 Warranty

A. Provide manufacturer's special 20 year weathertightness No Dollar Limit (NDL) Roofing System Warranty. Hail Resistance: Severe Hail (SH) (No exclusions for 2" hail)

B. Pro-rated System Warranties shall not be accepted.

C. The roof and associated work shall be guaranteed by the General Contractor against leaks from faulty or defective materials and workmanship for a period of five (5) years, starting on the date of acceptance of the project by the Owner.

D. **Manufacturer's roofing guarantees shall contain language regarding the governing of the guarantee by the State of Alabama, otherwise amend the requirement and state that the Laws of the State of Alabama shall govern all such guarantees.**

E. Roofing Installers Warranty: Submit roofing Installer's warranty on Installers letterhead, signed by Installer, covering all work of this contract, including incidental items, for the following warranty period:

Warranty Period: Five (5) years from date of Substantial Completion.

F. State of Alabama General Contractor's Roof Guarantee: Covering Work of this Section, including all components of the roofing system for the following warranty period:

Warranty Period: Five (5) years from date of Substantial Completion.

G. All warranties shall be dated within 30 days of substantial completion.

H. **The Representative for the Roofing Materials Manufacturer shall bring a copy of the warranty(ies) for the roofing material(s) for comparison to the warranty(ies) specified. This sample warranty is required to be job specific, covering all requirements, per the specifications. If the sample warranty is not provided as required, the conference will be voided, an inspection fee will be issued, and it will have to be rescheduled.**

## 2.0 - PRODUCTS

### 2.1 General

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

1. Carlisle SynTec, Incorporated. (60 mil)

2. Johns Manville (60 mil)

3. Commercial Innovations, Inc (SealTite) (60 mil)

4. Versico Roofing System (TPO - Versiweld - 60 mil)

B. All products (including insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the system warranty.

### 2.2 Membrane

Provide 60 mil min. thick reinforced TPO (Thermoplastic Polyolefin) membrane as needed to complete the roofing system. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal 15 mil thick. Color to be selected by Architect.

### 2.3 Insulation/Underlayment

A. When applicable, insulation shall be installed in multiple layers. The first and second layers of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.

B. Insulation shall be as indicated.

C. Coverboard (SecuRock, Densdeck, ½" SecurShield HD ISO)

2.4 Adhesives and Cleaners

A. All products shall be provided from approved manufacturer and specifically formulated for the roofing system specified herein.

1. Bonding Adhesive
2. Edge Sealant
3. Sealer: Water Cut-Off Mastic (as recommended by roofing manufacturer)
4. Pocket Sealant: TPO Molded Pocket Sealant (as recommended by roofing manufacturer)
5. Membrane Cleaner

2.5 Fasteners and Plates

A. To be used for mechanical attachment of insulation and to provide additional membrane securement:

1. Pre-Assembled Fasteners: A pre-assembled 3" diameter Plastic Plate and standard Phillips head fastener used for insulation attachment into steel or wood decks. Installed using Olympic Fastening Tools.

2. CI Term Bar Nail-Ins: A 1-1/4" long expansion anchor with a zinc plated steel drive pin used for fastening the Termination Bar or Seam Fastening Plates to concrete, brick, or block walls.

3. Seam Fastening Plates: a 2 inch diameter metal plate used for additional membrane securement.

4. Insulation Fastening Plates: a nominal 3 inch diameter plastic or metal plate used for insulation attachment.

2.6 Metal Edging and Membrane Terminations

Termination Bar: 1 inch wide and .098-inch-thick extruded aluminum bar pre-punched 6 inches on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.

2.7 Other Materials

Metal Flashing, specified under Section 07621.

3.0 - EXECUTION

3.1 General

A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, job site considerations and weather restrictions.

B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.2 Insulation Placement and Attachment

A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with the required insulation adhesive and manufacturer's specification to meet wind zone requirements (FM I-90) and 130 MPH wind speed at roof level.

3.3 Membrane Placement and Attachment

A. Position membrane over the acceptable substrate. Fold membrane sheet back lengthwise (onto itself) so half the underside of the membrane is exposed.

B. Apply Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.

2. Fold back the unbonded half of the sheet lengthwise and repeat the bonding procedures.

C. Position adjoining sheets to allow a minimum overlap of 2 inches.

D. Hot air weld the membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.

E. Pull the membrane back along the welded splice so the entire underside of the membrane is exposed once the Hot Air Weld has been completed.

F. Apply Bonding Adhesive to the exposed underside of the membrane sheet and the substrate.

G. Allow adhesive to dry until tacky and roll the membrane into the substrate and brush down the bonded section with a bristle broom following the procedure noted above.

H. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches and complete the bonding procedures as stated previously.

3.4 Membrane Splicing/Hot Air Welding Procedures

A. Hot air weld the membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's specifications. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam. (Note: When using .060" thick membrane, all splice intersections shall be overlaid with non-reinforced flashing)

B. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).

C. Repair all seam deficiencies the same day they are discovered.

D. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.5 Flashing

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using reinforced membrane. Non-reinforced membrane can be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.6 Walkways

A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.

B. Hot air weld walkway pads to the membrane in accordance with the manufacturer's specifications.

3.7 Daily Seal

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.8 Clean Up

A. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Scope

The work under this section consists of all sheet metal work, including metal flashing, trim and roof drainage accessories.

### 1.2 Applicable Standards / Quality Assurance

A. The workmanship and methods employed for forming, anchoring, joining, and measures for expansion and contraction of sheet metal work shall conform to the applicable details and standards as indicated in the "Architectural Sheet Metal Manual, 6th Addition" as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc. and referred to as "The SMACNA Manual," unless other methods are indicated on the project drawings or specified herein.

B. See Division 1 for required Pre-Roofing Conference.

C. Prior to fabrication, verify field conditions and coordinate the work if this section with trades of adjoining work as required to provide a complete weathertight system consistent with roofing manufacturer's warranty requirements. The work of this section is subject to acceptance by the Roofing Material Manufacturer and Roofing Contractor. Verify the substrate to be sound, dry, properly sloped, clean, and secure prior to installation of sheet metal work.

D. Workmanship shall be of best quality. Shop fabricate sheet metal components whenever possible without tool marks and oil-canning. The various sections shall be uniform and have true lines. The joints at corners, angles and different sections shall be accurately fitted and rigidly secured. Exposed edges are to be folded back, joints are to be flat lock seamed and soldered, expansion is to be provided for in long run work. Provide materials of this section and installation to promote longevity and prevent water infiltration.

E. Galvanic action shall be prevented where two different metals are joined together. Use bitumastic coating or other approved method.

F. Sheet Metal and Flashing / Trim shall be provided in thickness or weight to withstand wind loads according to zone (but in no case less than 90 MPH winds), thermal movement and building movement as required to avoid compromise of quality. Roof edge flashing components shall meet or exceed recommendations of FMG Loss Prevention Data Sheet 1-49.

G. Comply with the following material and finish standards: ASTM D 2244-68, ASTM D 659-74, ASTM A 653/A 653M, ASTM A 755/A 755M, ASTM A 792/A 792/M, ASTM C 1311 and ASTM D 4586

### 1.3 Related Documents

Drawings and Division 1 of the Specifications

### 1.4 Handling and Storage

Sheet metal items shall be carefully handled to prevent damage and shall be stored above the ground in a covered dry location. Damaged items that cannot be restored to a like new condition will be rejected and shall be replaced. Materials shall not be stored on the roof.

1.5 Verifying Dimensions

The contractor shall verify governing dimensions at the building and examine adjoining work on which sheet metal is dependent for installation according to the intent of this specification.

1.6 Examination of Surfaces

The contractor shall examine all surfaces to be covered with sheet metal, shall report any defective surfaces to the architect, and shall not begin work until the defective surfaces have been corrected.

1.7 Submittals and Samples

A. Submit product data, color charts and samples with intended factory finish and profiles of each product as detailed in SECTION 01350.

B. Submit Shop Drawings with plan layouts, elevations and enlarged construction details of each applicable roof condition, identified and shown with dimensions, profiles and relationship to adjoining components and materials. Indicate the following as applicable: gauge, weight, thickness, fastening, joining, support, anchoring, expansion measures, etc.

## 2.0 - PRODUCTS

2.1 Sheet Metal Materials

A. Zinc-Coated (Galvanized) Steel Sheet -G90 (Z275) coated, structural quality. (minimum 24 ga.)

B. Factory Finished Baked Enamel Aluminum-Zinc-Coated (Galvalume) Steel Sheet, Class AZ50 coating designation Grade 40, Class AZM150 coating designation Grade 275.

1. Material shall be minimum 24 ga. approved equal to "MBCI Batten-Lock", "AMS Lock-Seam" or "AEP-SPAN Span-Lock" with factory sealant and striations.
2. Factory finish shall be approved equal to KYNAR 500. Color to be selected by the Architect through the submittal process.

2.2 Underlayment

Cold applied, self-adhering elastomeric sheet 30 mils minimum thickness with releasable paper backing. Install as per manufacturer's recommendations.

2.3 Sealing Materials

A. Sealant shall be elastomeric polyurethane polymer as recommended by manufacturer for use with the work of this section for a finished weathertight installation.

B. Elastic Sealing Tape with releasable paper backing shall be provided as recommended by manufacture for use with the work of this section for a permanent weathertight installation.

C. Asphalt Roofing Cement shall be asbestos free and comply with ASTM D 4586 and used only as recommended by manufacture for use with the work of this section for a finished weathertight installation.

D. Butyl Sealant shall comply with ASTM C 1311 and used only as recommended by manufacture for use with the work of this section for a finished weathertight

installation.

E. Bituminous Asphalt Mastic, cold applied, shall be asbestos free and used only as recommended by manufacture for use with the work of this section for a finished weathertight installation.

2.4 Fastening

A. Unless indicated otherwise, fastening system shall be concealed with cleats for expansion / contraction abilities, at exposed visible finished flashing and trim.

B. Nails, self-tapping screws, bolts, rivets, and other fastenings for sheet metal shall be of the size and type suitable for the intended use. Exposed fasteners shall match contacted sheet metal finish.

2.5 Sheet Metal Work - Roof Drainage Accessories and Fabricated Components

A. Gravel guards, high and low; Counter Flashing; Flashing Receivers; Eave and Rake Flashing and Equipment Support Flashing as indicated and/or required shall be fabricated from prefinished 24-gauge sheet metal material.

B. Fascias and/or Coping to shape indicated and/or required. shall be fabricated from prefinished 24-gauge sheet metal material and attach continuously with 20 gauge concealed cleats.

C. Gutters shall be fabricated per sectional profile as indicated with factory pre-finished sheet metal material of thickness as necessary to structurally support weight of rain water loading according to manufactures calculation charts; but in no case less than 24 gauge. Gutter shall be provided in maximum lengths, not less than 8'-0" . Support gutter with 1 ¼" wide x 16 gauge straps of matching material at 30" max. o.c. Provide the following fabricated gutter accessories as required: sealed outlet tubes, ends, expansion joint covers, etc. of matching material. Gutter Expansion Joints shall be provided 50'-0" o.c. maximum.

D. Downspouts, shall be fabricated rectangular in sectional profile with factory pre-finished sheet metal material of thickness as necessary to structurally support weight of rain water loading according to manufactures calculation charts; but in no case less than 24 gauge. Neatly miter all angled joints & elbows. Provide the following fabricated downspout accessories as required: 16-gauge x 1 ¼" wide hanger straps of matching material w/ anchor fasteners, minimum three per downspout; precast concrete splash blocks; 24 gauge fabricated splash pans, etc.

E. Downspout strainers shall be installed in top of each downspout. Metal strainers shall be 1/2" woven mesh not less than 4" high and extend full coverage into downspout.

2.6 Miscellaneous Sheet Metal Work

Sheet metal items not covered elsewhere in this section shall be as indicated on the drawings and as required to form a watertight installation. Profiles, bends, and intersections shall be sharp, even, and true. Joints shall be locked, or lapped and soldered, as applicable.

A. Metal Flashing and Counter Flashing exposed to view. Fabricate and install in accordance with related work manufacturer's requirements.

1. Flashing for all projections through walls and/or roof which are not furnished under other sections.

2. Metal flashing for equipment specified under Plumbing, Mechanical, and/or Electrical Sections, projecting through the walls and/or roof shall be furnished under the respective sections and accepted / installed under this section.

B. Accessories
All accessories or other items essential to completeness of sheet metal installation, though not specifically shown or specified, shall be provided compatible with comparable material specified.

2.7 Plumbing Vent Flashing
All plumbing stacks projecting through the roof shall be flashed appropriately according to compatibility with roofing system with either: 3 lb. lead flashing extending up plumbing vent stack and turned down into vent stack (minimum 1") or prefabricate Deck-tight as approved by the roofing system manufacturer.

2.8 Project Identification Plaque
Provide an engraved aluminum plaque, nominal 4"x 6" x 1/8" thick, with information pertinent to the project including the following: Date of roofing installation, Roofing Manufacturer, Contractor, Architect, Roofing Product, Warranty period, etc.

## 3.0 - EXECUTION

3.1 General

A. All sheet metal work, including but not limited to: flashing, counter flashing, gravel stops, post / pipe flashing, fascia, trim flashing, rake flashing, gutters, downpipes, scuppers, pans, etc. shall be quality installed as required and/or indicated on the drawings for a complete weathertight system.

B. Surfaces to which sheet metal is applied shall be even, smooth, sound, thoroughly clean and dry, and free from defects that might affect the application or appearance.

C. Materials furnished under this section which are to be built in by others shall be delivered to the site in time to avoid delays to construction progress.

D. All cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades shall be performed under this section. Torch cutting or abrasive saw cutting shall not be allowed.

E. Where sheet metal is in contact with dissimilar metals, mortar, concrete or masonry materials, the dissimilar surfaces shall be kept from direct contact by painting the contact surfaces with a coating of an approved bitumastic compound. Sheet metal in contact with treated wood shall have an underlayment backing of waterproof membrane for contact separation.

F. Plumbing vents roof penetrations shall be located and provided by the Roofing Contractor in coordination with the Plumbing Contractor.

3.2 Fabrication

A. Fabricate and install sheet metal with lines, arises, and angles sharp and true and plane surfaces free from wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form a 1/2" wide hem on the side concealed from view. Finished work shall be free from water leakage under all weather conditions.

B. All items shall be fabricated in maximum lengths. All joints shall be held to a minimum and spaced symmetrical. Joints shall be neatly sealed with an elastomeric sealant to achieve weathertightness.

3.3 Expansion

All sheet metal work shall be so designed and anchored that the work will not be "oil-can" distorted nor the fastenings seriously stressed from expansion and contraction of the metal.

3.4 Installation

A. This contractor shall cooperate and coordinate with other trades in the correct placing of anchorage and the preparation of surfaces which are to receive sheet metal work. Any defects in the work of other trades shall be reported to the architect. The beginning of installation work by this contractor shall indicate his acceptance of adjoining work.

B. All sheet metal work shall be set level and to true planes as indicated on the drawings and installed as intended in a first quality manner according to standards of SMACNA and industry standards for a complete watertight flashing system.

C. Anchor bolt or screws used to secure the work to other materials or at expansion joint covers shall be tightened sufficiently to properly secure the work and still permit expansion and contraction of the assembly.

D. Install roof drainage accessories as required for a complete watertight roof drainage system according to the standards of SMACNA.

Gutters

1. Gutters shall be installed to slope to downspouts
2. Gutter joints shall be lapped, riveted and soldered and sealed with elastomeric sealant to prevent leaking.
3. Provide expansion joint with back-to-back sealed end closures not to exceed 50' o.c. and joint caps to lap 4" minimum.
4. Anchor gutter sections at upper limits to eave or fascia with straps to support outer limits at 30" o.c. max.
5. Provide gutters with sealed end closures.

Downspouts

1. Provide sealed outlet tube at connection to gutter.
2. Provide 1 ½" telescoping section joints
3. Provide Fastener straps to secure downspout to and 1" off of the wall at approximately 48" o.c.
4. Provide turn-out elbows where indicated to direct water away from the building base onto splash blocks on grade or splash pans on adjacent roof surface. Splash pans shall be set in elastomeric sealant. Provide strait boot connection where boots are indicated to direct water into below ground storm drainage.
5. Coordinate location of downspouts with architectural building elevation drawings; contact the Architect if conflicts occur.
6. Minimum size 4" x 5"

E. Utilize appropriate fasteners to penetrate substrate as follows: 1 ¼" minimum for nails and ¾" minimum for screws. Fasteners into treated wood shall be stainless steel.

1. Fasten roof edge flashing per recommendation of FMG Loss Prevention

Data Sheet 1-49 according to zone but space not more than 4" o.c. staggered.

2. Bottom limits of roof edge flashing shall be provided with interlocked continuous cleats fastened to substrate 12" o.c.

F. Pipe / Post Flashing shall be wrap-around umbrella type with tightened s.s. draw band and flared upper edge with sealant fill to achieve minimum 5" of coverage at pipe / post perimeter.

G. Permanently attach the Project Identification Plaque where readily visible from the roof and in immediate proximity of the work of this project.

3.5 Roof Flashing Installation

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, NRCA's "Roofing and Waterproofing Manual" 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.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and no less than 4" on center staggered.

1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 12" centers through the vertical leg face.

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 roof flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over counter flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant; interlocking folded seam or blind rivets and sealant as indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof.

3.6 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. Reglets: Saw-cut reglets a minimum of one (1") inch deep by one quarter (¼") inch wide into masonry substrate/wall at locations indicated.

3.7 Miscellaneous Flashing Installation

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 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. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

E. After installation is completed, all sheet metal work shall be cleaned with solution recommended by Metal Manufacturers. Refinish metal where necessary, replace damaged parts, and leave in complete and finished condition.

3.9 Warranty

A. Provide Manufacturer's Standard Twenty (20) Year Finish Warranty to support factory finish shall not chalk, peel, crack, fade or change in color in excess of 2 NBS units as per ASTM D 2244-68.

B. The work of this section shall be concurrently covered under the "General Contractor's Five (5) Year Roofing Guarantee" as required by the State of Alabama per Division 1.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope
The work under this section consists of caulking and sealants.

1.2 Work Included
See the drawings for all items and places requiring caulking. Completely seal with specified caulking compound joints around door frame and frame base and window frames (inside and outside); all other openings in masonry, concrete, or precast concrete joints in or between precast concrete panels; beneath all exterior thresholds; around plumbing fixtures; all places indicated on the drawings to be caulked; and all other places where caulking is required, whether specifically shown on the drawings or not.

1.3 Submittals
Submit for approval product literature and samples of all materials proposed for use. Colors to be approved in the field by the Architect to match adjacent construction color.

## 2.0 - PRODUCTS

2.1 Sealant

A. Exterior sealant shall be a gun grade one part silicone compound. Materials shall be Tremco Spectrem 1, Dow Corning No. 790 or Pecora No. 890, color as selected.

B. Primer, if required, for the silicone sealant shall be a quick drying clean primer as recommended by the manufacturer of the material used.

2.2 Caulking

A. Interior caulking compound shall be a paintable, one part, gun grade butyl rubber base material equal to Tremco Tremflex 834 Acrylic, Pecora BC-158 or DAP Butyl Flex or acrylic latex base caulking compound equal to Pecora AC-20 or DAP Latex Caulk.

B. Floor Caulking compound shall be a tintable, semi-self leveling polyurethane base equal to Tremco THC900/901. Colors shall be selected by Architect from manufacturers entire line of colors.

2.3 Fire Caulking
All locations indicated and/or all penetrations or openings into fire barriers shall be sealed with fire caulk material meeting UL requirements for such application. Submit product literature indicating UL compliance for approval. All trades shall use same fire caulk product. Installer shall be certified by the manufacturer.

2.4 Compressible Joint Sealant
Sealant shall be compressible polyurethane foam impregnated with polybutylene, Polytite as manufactured by Polytite Manufacturing Corporation, or other material as approved.

2.5 Filler
Filler shall be polyethylene foam, polyurethane foam, untreated jute, pointing mortar or other oil-free materials subject to approval of the manufacturer of the caulking or sealant compound.

2.6 Accessories

A. Bond breaker shall be polyethylene tape.

B. Solvents, cleaning agents, and other accessory materials shall be as recommended by the sealant manufacturer.

3.0 - EXECUTION

3.1 Joint Preparation

A. Joints deeper than 1/2" shall be built up to a depth of 3/8" below adjacent surfaces with approved filler material prior to applying sealant. All surfaces must be clean and dry. Any protective coating or foreign matter such as oil, dust, grease, dirt, or frost on building materials that will impair bond shall be removed. Masonry and concrete surfaces shall be sound. If required by manufacturer's instructions, apply brush coat of primer to surfaces and allow to dry before applying sealant.

B. At the option of the applicator, the surfaces next to the joints may be masked to obtain a clean neat line. Remove tape immediately after tooling the sealant.

3.2 Application

A. Caulking or sealant shall be used from manufacturer's original cartridge in a standard open type, hand operated caulking gun. Nozzle shall be cut to proper size to obtain a neat, smooth and uniform bead. When handling bulk material, manufacturer's instructions shall be followed.

B. A full bead of caulking or sealant shall be applied into joint under sufficient pressure, drawing nozzle across caulking or sealant to leave a slightly concave surface. Tool with a caulking tool or soft bristled brush moistened with solvent within 10 minutes after exposure. All sealed joints shall be watertight.

C. Joints shall be caulked before painting adjacent work. Do not paint over silicone sealant compound.

D. Fire caulk shall be installed to comply with manufacturer's requirements, UL requirements, and requirements of authority having jurisdiction.

3.3 Clean-up

On non-porous surfaces, excess uncured caulking shall be immediately removed with a solvent moistened cloth. On porous surfaces, excess caulking should be allowed to cure overnight, then remove by lightly wire brushing or sanding. All adjacent surfaces shall be clean and free from stains.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

Furnish and install all hollow metal doors and frames including view windows, as indicated on the drawings and herein specified.

1.2 Submittals

A. Submit shop drawings for approval.

B. Drawings shall show a schedule of openings using architectural opening numbers, all dimensions, jamb and head conditions, construction details, preparations for hardware, gauges, and finish.

1.3 Templates

A. Manufacturer shall obtain templates of all applicable hardware from the Finish Hardware Contractor and make proper provision for the installation of this hardware.

B. Unless otherwise specified in the hardware section of the specifications, hardware locations shall be in accordance with the recommendations of The National Builder's Hardware Association.

1.4 Marking and Storage

Mark each frame for intended location. Store frames off the ground and in a manner to protect them from damage.

1.5 Storage

A. Doors shall be stored in a dry, secure location to prevent exposure to weather and/or moisture.

B. Frames shall be stored off the ground and protected from weather until in place.

## 2.0 - PRODUCTS

2.1 Door Construction

A. Exterior Doors: Formed up sheets not less than 16 U.S. gauge rigidly connected and reinforced inside with continuous interlocking 20-gauge hat stiffeners, spaced a maximum of 6" apart. Interior Doors: Formed up sheets not less than 18 U.S. gauge rigidly connected and reinforced inside with continuous interlocking 20-gauge hat stiffeners, spaced a maximum of 6" apart. Sound deadening material of rock wool batts, insulites or other standard recognized available sound deadening materials shall be placed between all stiffeners and plates. Honeycomb doors are not acceptable. Suitable provision shall be made to receive glass panels or louvers. Edge seams are to be continuously welded and ground smooth. Bondo seams are not acceptable.

C. Doors and frames shall be equal to Steelcraft, Curries, Republic or approved equal.

D. Doors shall be coordinated with thresholds specified under FINISH HARDWARE - SECTION 08710 to meet A.D.A. requirements. Doors shall be extended as required to seal against threshold.

E. Hollow metal doors shall be provided with beveled hinge and lock edges. Bevel

hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm).

F. Exterior door face sheets shall be galvannealed steel, level A60 (ASTM A653).

G. Hardware preparation for hollow metal doors: hinge reinforcements shall be minimum 7-gauge x 9" length.

H. Hardware Reinforcements:

1. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].

2. Lock reinforcements : minimum 16 gage [0.053" (1.3mm)].

3. Closer reinforcements : minimum 14 gage [0.067" (1.7mm)], 20" long.

4. Galvannealed doors: include Galvannealed hardware reinforcements. Include Galvannealed components and internal reinforcements with Galvannealed doors. Close tops of exterior swing-out doors to eliminate moisture penetration. Galvannealed steel top caps are permitted.

5. Projection welded hinge and lock reinforcements to the edge of the door.

6. Provided adequate reinforcements for other hardware as required.

I. Glass moldings and stops (both labeled and non-labeled doors):

1. Fabricate glass trim from 24 gage [.6mm] steel conforming to:
   a. Interior openings ASTM designation A 366 cold rolled steel.

   b. Exterior openings ASTM designation A 924 Zinc-Iron Alloy-Coated Galvannealed steel with a zinc coating of 0.06 ounces per square foot (A60) for exterior openings.

      1) Install trim into the door as a four-sided welded assembly with mitered, reinforced and welded corners.

      2) Trim: identical on both sides of the door.

      3) Exposed fasteners are not permitted. Labeled and non-labeled doors: use the same trim.

      4) Acceptable mounting methods:
         a) Fit into a formed area of the door face, not extending beyond the door face, and interlocking into the recessed area.
         b) Cap the cutout not extend more than 1/16" [1.6mm] from the door face.

J. Electrical Requirements for Doors:

General: Coordinate electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.

A. Doors with Electric Hinges:

a. General: Furnish conduit raceway to permit wiring from electric door hardware.

b. Hinge Locations: Provide electric hinge at intermediate or center location. Top or bottom electric hinge locations are not acceptable.

c. Refer to 08710 for electrified hardware items.

2.2 Frame Construction

A. Frames shall be of sizes as indicated, completely assembled, buck and frame formed from 14-gauge exterior, 16-gauge interior, steel with 2" face unless otherwise indicated and 5/8", minimum, integral stop. Exterior frames and interior frames at cafeteria, kitchen, locker room and shower areas shall be Galvannealed A60 (ASTM A653).

B. Corners of frames to be mitered and continuously welded. Joints shall be pulled up tight, welded, and ground smooth with faces in correct alignment.

C. Provide adjustable "T" type anchors, three to each jamb; welded angle clips at bottom of frames for anchorage to floor construction; detachable type metal spreaders. Jamb anchors shall be T-shaped and of the same thickness as the metal of the frames. Where "T" anchors are not feasible, provide anchors as required and/or recommended.

D. Machine frames for attachment of hardware, including special reinforcing for extra heavy duty use, drilling, and tapping. Provide mortar tight metal dust boxes in back of lock location.

E. Frames for sidelights shall be integral with door frames; borrowed light window frames and other openings shall be as detailed.

F. Prepare frames for rubber silencers, three for single swing door and two for each pair of doors.

G. Frames not extending to the floor surface shall have a closed welded jamb bottom.

H. Electrical Requirements for Frames:

1. General: Coordination all electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.

a. Provide cutouts and reinforcements required for metal door frame to accept electric components.

b. Frame with Electrical Hinges: Weld UL listed grout guard cover box welded over center hinge reinforcing. Top or bottom hinge locations are not permitted. Contractor to reference 3.01.E, for continuous hinges.

c. Provide cutouts and reinforcements required to accept security system components.

d. Refer to 08710 for electrified hardware items.

2. Provide mortar box, welded in head of door frame at exterior frames for future door contact switch provided by Owner. Size, type, location and conduit requirements to be provided by Owner.

2.3 Labeled Assemblies

A. All openings shall be protected by assemblies which include doors, frames, hardware, closing devices, anchorage, sills, etc. installed in accordance with NFPA Standard "FIRE DOORS and WINDOWS, NFPA 80," as per Standard Building Code.

B. To further clarify the basic requirements and/or the correct method of labeling that will be acceptable; the labels will include, but not be limited to, the following:

1. **Labeling of Fire Doors and Frames**
All door openings in fire resistive walls and partitions requiring a rating shall be protected by assemblies which include doors, frames, hardware, closing devices, anchorage, sills, etc., installed in accordance with the National Fire Protection Association (NFPA) 80, Standard for "Fire Doors and Fire Windows" and the State Building Code.

To further clarify the basic requirements and the correct method of labeling that will be acceptable to the Division of Construction Management, the labels shall include the following:

a. Accessibility: Each component shall bear a label located to be accessible after installation.

b. Permanence: Each component shall bear a label of a type of material and be so attached that the life of the label and the attachment thereof can reasonably be expected to equal the life of the component to which it is attached. Labels shall be raised or embossed on metal labels or stamped into metal frames. Plastic or paper labels are unacceptable.

c. Legibility: The label design shall be such that it can always be visible and legible and must be clean of any paint or other coverage making the label illegible.

d. Fire Resistance: All approved labels on doors and on frames shall include thereon the fire resistance rating in hours and minutes for which the door or frame is labeled. Labels on frames with transoms or sidelights must identify that the opening assembly includes same.

e. Other Requirements: The labels or stamps applied to frames must be provided by a manufacturer that has been approved by a laboratory or organization to provide testing and follow-up services for fire-rated opening assemblies.

2. Other Requirements - As directed by the approved laboratory or organization providing testing and follow-up services and labeling.

2.4 Finish

A. Metal doors and frames shall be thoroughly cleaned of dirt, grease, and impurities and shall be bonderized and finished with one coat of baked-on primer ready to

receive finish paint.

B. Primer shall be manufacturer's standard in accordance with ASTM B117. **Do not prime paint labels**.

C. Final painting as specified and applied under Painting Section.

3.0 - EXECUTION

3.1 Installation

A. **BITUMINOUS COATING IS TO BE FIELD APPLIED TO THE INSIDE OF FRAMES THAT ARE TO BE INSTALLED IN MASONRY, OR TO BE GROUTED, PRIOR TO INSTALLATION.**

B. Install frames plumb, rigid, and in true alignment; properly brace until built in. Set spreader and attached jambs to floor through floor anchors.

C. In masonry openings, where required, install a second spreader at the mid-height of the door opening, and do not remove until the masonry jambs are in place. Spreader shall be notched wood of approximate jamb width and 1" minimum thickness. Install a minimum of three anchors per jamb to be imbedded in masonry joint as the wall is laid up.

D. Frames shall be grouted solid.

E. Doors shall be rigidly secured in frames, hardware applied, and adjusted to achieve smooth operation without forcing or binding. Doors shall be capable of maintaining any degree of opening.

3.2 Protection

After installation, doors and frames shall be protected from damage during subsequent construction activities. Damaged doors and frames shall be replaced.

END OF SECTION

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 Section Includes

A. Flush Wood doors

B. Acoustical Rated Doors

C. Positive Pressure Fire Rated Wood Doors

D. Factory Glazing for Fire Rated Doors

1.3 Related Sections

A. Section 08110 – Hollow Metal Doors and Frames

B. Section 08710 – Finish Hardware

C. Section 08810 – Glass and Glazing

1.4 Requirements Of Regulatory Agencies

A. Wood Doors and installation shall comply with provisions and standards listed. The latest published edition of each standard applies.

B. ASTM - American Society for Testing and Materials

1. ASTM E 90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements. (All doors tested shall be fully operable.)
2. ASTM E 413-10 - Classification for Rating Sound Insulation.
3. ASTM F 476 Section 18 - Security Test of Swinging Door Assemblies - Door Impact Test

C. ANSI - American National Standards Institute

1. ANSI/DHI A156.115W - Specifications for Hardware Preparation in Wood Doors and Frames.
2. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.
3. ANSI A156.7 - Hinge Template Dimensions.
4. ANSI/HPVA HP-1 Standards for Hardwood and Decorative Plywood
5. ANSI A208.1-Particleboard
6. ANSI A208.2-Medium Density Fiberboard (MDF)
7. ANSI-ASA S12.60 - Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools
8. ANSI/A117.1 – Accessible and Useable Buildings and Facilities

D. ANSI/WDMA – Window and Door Manufacturers Association

1. WDMA I.S. 1A-13, Industrial Standards for Architectural Flush Doors

   a. J-1 – Job Site Information "How to Store, Handle, Finish, Install, and Maintain Wood Doors"
   b. P-1 – Performance Standards for Architectural Wood Flush Doors
   c. T-1 – Test for Telegraphing
   d. T-2 – Test for Warp
   e. T-3 – Test for Squareness

2. WDMA Test Methods - Provide documentation showing compliance to WDMA performance duty level.

   a. Adhesive Bonding Durability: WDMA TM-6
   b. Cycle Slam: WDMA TM-7
   c. Hinge Loading: WDMA TM-8
   d. Screw Holding: WDMA TM-10

E. Building Code references

1. IBC – 2021 International Building Code
2. NFPA 80 - Standard for Fire Doors and Other Opening Protective's.
3. NFPA 101 – Life Safety Code
4. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protective's
5. NFPA 252 – Standard Method of Fire Tests of Door Assemblies
6. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies
7. UL 1784 - Air Leakage Tests of Door Assemblies
8. Underwriters Laboratories (UL) - ULI0C Positive Pressure Fire Test of Door Assemblies
9. ITS/WH Certification - Certification Listings for Fire Doors
10. Consumer Products Safety Commission (CPSC) 16 CFR 1201 – Standard for Architectural Glazing
11. US Green Building Council (USGBC)

1.5 Supplier Qualifications

A. The Wood Door Supplier shall maintain at the location which will be managing the project, a credentialed Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) as a full-time employee and member in good standing of DHI - Door Security + Safety Professionals.

B. The Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) shall supervise other individuals employed by the Wood Door Supplier who work on the project and be available throughout the project to meet with the Contractor, Architect or Owner as needed.

C. Supplier shall be experienced and have completed projects with material, design and scope similar to that specified for this project. If requested by the Owner or Architect, submit a list of projects completed in the last five (5) years with the project name, location, Owner, Architect and Contractor.

D. As a requirement, the Wood Door Supplier shall maintain an office and warehouse complete with a wood door inventory within a one hundred (100) mile radius of the jobsite. The Supplier shall further have a qualified field service staff available to service the project.

E. After delivery of wood doors and prior to installation, the Hardware or Door Consultant shall meet with the Contractor to review templates, installation instructions, final hardware schedule, coordination with other trades and preview samples.

F. Failure to meet the above requirements will disqualify the bidder.

G. The Owner may visit the location of the Distributor's office and warehouse to observe if the intent of the requirements set forth in the specifications have been met.

1.6 Submittals

A. Submit complete copies of the wood door shop drawings covering complete details of items required for the project. Complete copies of technical data sheets and other pertinent data are required to indicate compliance with the specification.

1. Shop Drawings: Submit door and frame schedule using reference designations indicated on Drawings. Include opening size(s), handing of doors, details of each frame type, elevations of door design types, location, hardware group numbers, fire label requirements, including fire rating time duration, maximum temperature rise requirements, hardware mounting locations, glass beads/moldings, glass kits, internal blocking, vertical edge details, top and bottom rail details, undercuts, beveling and other pertinent data.

B. As part of the Shop Drawing submittal, provide copy of WDMA J1, Job Site Information, "How to store, handle, finish, install and maintain wood doors."

C. Data submitted shall be job specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents.

D. Provide door construction details/drawings of vertical edges, top rail and SWE details for all doors.

E. Indicate location of cutouts for hardware and blocking to ensure doors are properly prepared and coordinated to receive hardware.

F. Shop drawings, product data, and samples: Contractor to stamp Shop Drawings verifying they have been coordinated and reviewed for completeness and compliance with the contract documents.

G. Shop drawings submitted without the above documentation will be considered incomplete, will not be reviewed, and returned directly to the Contractor.

H. Follow the same procedures for re-submittal as the initial submittal with the appropriate revised dates noted in the shop drawings.

1.7 Quality Assurance

A. Comply with the requirements of the referenced standards. Submit test reports upon request by the Owner or Architect.

B. Underwriters' Laboratories or Intertek Testing Services / Warnock Hersey, Positive Pressure - Category A labeled fire wood doors:

1. Label fire doors listed in accordance with Underwriters Laboratories standard UL10C, Positive Pressure Fire Tests of Door Assemblies and Air Leakage Tests of Door Assemblies - UL 1784.
2. Construct and install doors in accordance with the standards of NFPA 80.
3. Manufacture fire rated doors under the UL or ITS/WH factory inspection program providing the degree of fire protection capability indicated by the door schedule drawings.
4. Provide metal labels permanently fastened on each fire door at an authorized and licensed facility as evidence of compliance with procedures of the labeling agency.
5. No field modifications shall be made to the fire door assembly that would void the label. Field modifications to a fire door shall be in accordance with NFPA80. Work shall be done by a licensed labeling service approved by the manufacturer.
6. Labels are not to be removed, defaced or made illegible while the door is in service per NFPA 80. Fire labels are not to be painted or pre-finished.
7. Fire doors with continuous hinges shall have the physical label located on the top rail of the door.
8. Conform to applicable codes for fire ratings. It is the intent of this specification that wood doors comply or exceed the standards for labeled openings. In case of conflict between door types required for fire protection, furnish the type required by NFPA and UL.
9. Validate the Smoke and Draft Control ("S") Label for hardware sets that include Category H smoke and draft control seals.
10. All Category G seals required will be concealed in the door or applied to the top rail. No Category G seals will be allowed on the door frame.

C. Door Supplier shall provide one (1) extra door with 6" top rail and exit device blocking. The Contractor, Door Supplier and the Owner to observe and inspect destructive sampling for proper internal construction.

1.8 Warranty

A. Provide Manufacturer's standard warranty form, signed by manufacturer, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship for the life of the original installation of the door.

1.9 Samples

A. Sample Submittal

1. Color samples for factory pre-finishing shall consist of four (4) sets of three (3) finish samples per set. Samples to be minimum 5" x 8" size on specified veneer species. The sample should reasonably represent the color range of the veneer species expected in the finished work.

B. Fire Rated Wood Doors

1. Provide three (3) 10" x 10" cut away corner samples demonstrating door construction with provisions for vertical stiles and top rails as specified.

C. Non-Fire Rated Wood Doors

1. Provide three (3) construction samples demonstrating door construction with provisions for vertical stiles and top rails as specified herein.

1.10 Delivery, Storage, And Handling

A. Provide protective measures throughout the construction period to safeguard doors from damage or deterioration from the time of acceptance.

B. Store and protect doors in accordance with manufacturer's recommendations and Section J-1 of WDMA I.S. 1A-13 - "How to Store, Handle, Finish, Install and Maintain Wood Doors"

1. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse and allow for air circulation.
2. Protect all doors from exposure to direct sunlight and artificial light after delivery.
3. Do not subject interior doors to extremes of either heat or humidity. HVAC systems must be operational and balanced, providing a temperature range of 50 to 80 degrees Fahrenheit and 30% to 60% relative humidity.
4. When handling doors, lift and carry when moving. Do not drag across other doors or surfaces. Handle with clean, dry hands or while wearing clean dry gloves.
5. Manufacturer shall mark each door on the top rail and top hinge pocket with the door opening number. In addition, mark the top rail with manufacture's name, factory order number, and other additional markings to properly identify the door.

1.11 Coordination

A. Coordinate work with other sections involving manufacture or fabrication of internal cutouts and internal blocking for door hardware, electrified and mortised items. Provide necessary blocking in mineral core doors to prevent door failure from surface applied hardware.

B. The Contractor shall field verify existing door opening conditions, where existing doors or frames are to remain or be replaced in part, for coordination with the specified hardware and notify the Architect of conflicts prior to proceeding. Failure to notify the Architect of conflicts that result in additional work or material is the responsibility of the Contractor, with no cost to the Owner.

C. The supplier shall be responsible for proper coordination, templating, dimensions and all details required for doors, frames and hardware application.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Acceptable manufacturers for wood doors specified are listed below. Only the products of the listed manufacturers will be accepted. No alternates will be

accepted. The manufacturers listed are acceptable providing they adhere to the quality standards as noted herein.

1. Eggers Industries
2. Marshfield-Algoma
3. V.T. Industries

B. **The manufacturers listed herein are capable of providing products that meet or exceed the specified requirements. Products that do not comply with the specified requirements and construction will be rejected.**

C. If doors are rejected, replacement doors shall be furnished expeditiously, at no cost to the Owner.

2.2 Doors

A. Quality Assurance Requirements: Flush Wood Doors: Comply with the ANSI/WDMA I.S. 1A–13 Industry Standard for Architectural Wood Flush Doors.

B. Non-Fire Rated Wood Doors - All solid core flush wood doors shall meet WDMA Door Grade and WDMA Performance Duty Level specified.

1. Grade-Custom Grade Construction and Face Grade.
2. WDMA Performance Duty Level-Extra Heavy Duty. All doors shall meet specified WDMA Performance Duty Level, including face screw holding requirement. Surface applied hardware shall be installed in accordance with Section 08710.
3. Door Type - PC-5 - Bonded Wood Based Particle Core, Stiles and rails securely bonded to the core and entire unit abrasively planed prior to application of faces to assure uniform thickness of all components.

C. Fire Rated Wood Doors: Where fire-resistance classifications are shown or scheduled, provide doors that comply with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Label Certification: Doors requiring fire-rating shall carry either UL or ITS (Warnock Hersey) label.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 degrees F (121 degrees C)] above ambient after 30 minutes of standard fire-test exposure.
3. Construction: Category A - intumescent included in door construction where required.
4. Cores: Provide wood fiber or mineral fire-resistant composite core required to provide fire-protection rating indicated.
5. Blocking: Provide composite blocking approved in doors of fire-protection ratings as indicated.

D. Electrical Requirements:

1. General: Make provisions for installation of electrical items specified in Section 08710.

a. Provide all cutouts and blocking required for wood doors to accept electrical door hardware and security system components.

E. Acoustical Doors:

1. Acoustical Doors shall conform to the American National Standard Acoustical Performance Criteria, Design Requirements and Guidelines for Schools, ANSI/ASA S12.60.

   a. These spaces include, but are not limited to, classrooms, instructional pods or activity areas, group instruction rooms, conference rooms, libraries, offices, speech clinics, offices used for educational purposes and music rooms for instruction, practice and performance.

2. Doors into classrooms and other core learning spaces shall conform to the requirements of ANSI/ASA S12.60 with a minimum of a STC 30 operable rating. Doors to music rooms and doors between two classrooms shall be a minimum STC 40 operable rating. Comply with additional requirements as noted in the door schedule.
3. Provide vision lite system consisting of acoustic glass, lite kit and glazing tape of the proper size and thickness to meet or exceed the STC acoustical rating of the door and frame assembly. Provide Anemostat LoPro-STC vision lite system. The vision lite system is to be factory installed on doors with a STC rating of 40 or greater.
4. Door manufacturer shall provide a Letter of Certification from an independent testing laboratory accredited as an acoustical laboratory verifying that conformance to the acoustical performance has been met. Testing shall be performed at laboratories that are fully accredited.
5. Coordinate door preparation for adjustable mortise door bottom as specified under Section 08710 Mortise prep to end 1/4" before edge of door at lock edge, Solid Wood Edge (SWE) prep configuration from DHSI. Bottom rail shall be hardwood or structural composite lumber. Doors are to be factory prepped to receive the door bottom.
6. Doors shall have a 3/8" undercut.
7. Sound seals and gasketing are not to be painted.

F. Veneer and Veneer Matching

1. Veneer Species and Cut: Architect to specify veneer and cut.

   a. Veneer Face Grade WDMA: Grade "A" as described in WDMA I.S. 1A and HPVA Door Veneer tables ANSI/HPVA-1.

2. Matching Between Leaves: Book Match
3. Veneer match: Assembly of Spliced Veneer: Running Match
4. Pair match all pairs and set of pairs separated only by mullions.
5. Set match all groups of pairs and/or individual doors indicated on the door schedule or plans.
6. Veneer Cut: Plain Sliced.
7. Veneer Species: Select White Birch.

G. Non- Fire Rated Door

1. Provide wood based particleboard core. Core to be securely bonded to the stiles and rails with Type I Adhesive.

2. Crossbands

   a. Shall be a minimum thickness of 1/16".
   b. Extend the full width of the door and have no seams.
   c. Composite crossbands of either MDF or particleboard are only permitted provided they meet or exceed the following minimum requirements:

      1) Minimum properties for composite crossband must meet physical and mechanical properties of thin MDF - Grade 230 as described in ANSI 208.2
      2) Internal bond minimum strength of 150 psi.
      3) Linear expansion minimum of < 0.3 % measured between 50% and 80% relative humidity.

3. Vertical Edges

   a. Vertical Edges to be same species as face veneer, constructed of two ply laminate hardwood outer layer (outer stile) and hardwood lumber or SCL inner layer (inner stile). Outer ply to be minimum thickness of 1/2" after trim, same species lumber as face. Veneer or lumber less than 1/2" is not acceptable. The net stile width to be minimum 1" after trimming. Veneer edge banding is not acceptable.
   b. Provide detail/cross section drawing of door edge construction.

4. Horizontal Edges

   a. Rails must be present on all doors.
   b. Rails are solid hardwood lumber, with grain running perpendicular to stiles. SCL is allowed for rails. Minimum rail after trim to be 7/8". MDF is unacceptable.

5. Side Panels

   a. Fabricate matching panels with same construction as the door. Side panels will be pair matched to the associated door and receive the same finish.

H. Fire-Rated Doors: Provide Positive Pressure Label Doors.

1. Positive Pressure labeled doors to be Category A

   a. Validate the Smoke and Draft Control ("S") Label for hardware sets that include Category H smoke and draft control seals.

2. Core material shall be dictated by manufacturer's fire door approvals.

   a. Provide 20 and 45-minute fire doors with wood based particleboard core construction where allowed by manufacturers procedure. Mineral core construction is acceptable when requirements exceed particleboard core label procedures.

3. Stiles (Vertical Edges) - Provide manufacturer's standard solid or laminated edge construction approved for each fire protection level with improved screw holding capability of 550 lbs. in accordance with WDMA TM-10, Extra Heavy Duty.

a. Outer stile to be minimum thickness of ¼" after trim, same species lumber as the face. Veneer or lumber less than ¼" is not acceptable. Veneer edge banding is not acceptable. Provide detail/cross section drawing of door edge construction.

4. Rails (Horizontal Edges) - Rails are solid lumber or other material contained in manufacturer's fire door approvals.
5. Blocking for fire doors must meet WDMA-EMD face screw pull values for surface hardware.

   a. All fire doors shall have a 6-inch minimum top rail after trim. 45-minute wood fire doors are not required to have a 6" combined blocking top rail provided assembly meets heavy duty level.

6. Pairs: Provide fire rated pairs with manufacturers approved stiles which match face veneer constructed as Category A. Veneered edges allowed where required to match face veneer. Exposed intumescent at door meeting edges or applied to frames is not acceptable.

2.3 Door Fabrication

A. Factory pre-fit and pre-machine doors to receive hardware as specified under Section 08710.

1. All doors shall be machined in accordance with manufacturer's procedures in order to maintain manufacturer's warranty and to avoid any machining conflicts.
2. Doors are to be beveled at both hinge and lock edges.
3. Factory pre-drill all hinge screw pilot holes for full mortise hinges.
4. Doors shall have a 3/8" undercut.
5. Coordinate door undercuts per architect's details and hardware specified under Section 08710.
6. All fire doors shall be in accordance with NFPA 80 for clearances and undercutting requirements.

B. Factory preparation for light openings:

1. Factory preparation for new wood doors glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the fire door listing and shall be installed in accordance with inspection service procedure and under label service per NFPA 80, 4.4.3.1.
2. Glass in new wood doors must be installed by the door manufacturer or in a licensed door shop.
3. Fire protection glazing and fire resistance glazing shall meet all applicable impact safety standards.
4. Provide metal vision kits at all fire labeled doors. Vision kits shall be Anemostat LoPro, 20 gage, with tamperproof screws and beige baked enamel finish. Install tamperproof screw heads on secure side of door. Vision kits shall have UL or W/H classification markings visible for inspection.
5. Wood beads for light opening in non-fire rated wood doors:

   a. Provide manufacturer's standard solid wood straight beads flush design, matching veneer species of door faces. Include finish nails for removable stops in accordance with manufacturers recommendations.

2.4 Factory Finishing

A. All doors, including light beads and moldings, to be factory finished where indicated in schedules or on drawings as factory finished.

B. Finish Requirements.

C. Manufacturer's standard UV Cured Acrylated Polyester/Urethanes, equal to WDMA TR-8.

1. Grade-Premium

2. Coating-Clear

3. Satin Gloss (Gloss range 30-40)

D. Package factory finished doors with manufacturers standard packaging to protect doors from damage during shipment.

PART 3 - EXECUTION

3.1 Installation

A. Install all wood doors in accordance with door manufacturer's instructions and all tolerances outlined in ANSI/WDMA I.S. 1A-13.

B. Install label doors in accordance with NFPA-80. Labels are not to be removed, defaced or made illegible while the door is in service.

C. Inspect doors prior to installation for any damage, manufacturing defects or pre-finish inconsistency.

D. Remove and replace doors that are damaged, warped, twisted or unacceptable to the Architect or Owner.

E. Should there be any door issues do not proceed with installation. Contact door supplier to correct unsatisfactory conditions and proceed with installation only after corrections have been made.

3.2 Adjusting

A. Final Adjustments: Adjust doors and hardware prior to final inspection and acceptance by the Architect and Owner. Replace defective items, including doors that are damaged or unacceptable to the Architect or Owner.

B. Fire Door Assembly Inspection and Testing: Upon completion of the installation, provide functional testing and inspection of each fire door assembly on the project to confirm proper operation and that it meets all criteria of a fire door assembly as per NFPA 80, 5.2 - Inspection and Testing 2013 edition. Inspections shall be performed by individuals with knowledge and understanding of the operating components of the door being subjected to testing and who are certified by Intertek as a Fire Door Assembly Inspector (FDAI) or a credentialed Architectural Hardware Consultant (AHC). A written report using reporting forms provided by the Door and

Hardware Institute shall be maintained and transmitted to the Owner, Contractor, Architect and made available to the Authority Having Jurisdiction (AHJ). The report shall list each fire door throughout the project, and include each door number, location, hardware set used and summary of deficiencies.

1. Schedule fire door assembly inspection within 90 days of Substantial Completion of the Project. Coordinate inspection with the Contractor and Owner.
2. Contractor shall correct all deficiencies and schedule a re-inspection of fire door assemblies which were noted as deficient on the inspection report. All deficiencies must be repaired without delay.
3. Inspector shall re-inspect fire door assemblies after repairs are made.
4. Additional re-inspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.

3.3 Protection

A. Provide protective measures required throughout the construction period to ensure that doors will be without damage or deterioration at time of acceptance.

End of Section

SECTION 08300 TORNADO-RESISTANT ASSEMBLIES

## 1.0 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. Hollow metal Tornado Doors
   2. Hollow metal Doors with Glass Lights
   3. Hollow metal Tornado Frames
   4. Hollow metal Tornado Shutters

B. Exclusions: Metal for the following is not provided under the scope of this section:
   1. Structural steel
   2. Headers and lintels
   3. Framing
   4. Steel channel frames
   5. Access panels
   6. Door hardware

C. Related Sections:
   1. Division 01 Section "Alternates" for alternates affecting the work of this section.
   2. Division 03 Section "Precast Structural Concrete"
   3. Division 04 Section "Unit Masonry"
   4. Division 07 Section "Joint Sealants"
   5. Division 08 Section "Steel Doors and Frames"
   6. Division 08 Section "Door Hardware"
   7. Division 08 Section "Glass and Glazing"
   8. Division 09 Sections for touchup finishing or refinishing of existing openings modified by the work of this section.
   9. Division 26 Sections for connections to electrical power system and for low voltage wiring work.
   10. Division 28 Sections for coordination with other components of other components of electronic access control system.

### 1.3 References:

A. Tornado Resistant Assemblies
   1. IBC – International Building Code
      a. 2021 Edition, Section 423 – Building types or functions and geographic locations to be built with a storm shelter.
   2. ICC/NSSA - International Code Council / National Storm Shelter Association
      a. ICC 500-2020 Standard for the Design and Construction of Storm Shelters
      b. Highlights of ICC 500-2020
   3. FEMA – Federal Emergency Management Agency
      a. FEMA P-361, Third Edition / March 2015 – Safe Rooms for Tornados and Hurricanes: Guidance for Community and Residential Safe Rooms
      b. FEMA P-320, December 2014 – Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business

B. Fire/Life Safety
   1. NFPA - National Fire Protection Association
      a. NFPA 70 – National Electric Code

b. NFPA 80 - Standard for Fire Doors and Fire Windows
c. NFPA 101 - Life Safety Code
d. NFPA 105 - Smoke and Draft Control Door Assemblies

2. State Fire Safety Code.

C. UL - Underwriters Laboratories
1. UL 10C - Positive Pressure Test of Fire Door Assemblies
2. UL 1784 - Air Leakage Tests of Door Assemblies

D. Accessibility
1. ADA - Americans with Disabilities Act.
2. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

E. SDI – Steel Door Institute
1. SDI 100/ANSI A250.8 - Recommended Specifications - Standard Steel Doors and Frames.
2. SDI Certified https://www.steeldoor.org/sdicertified.php
3. SDI 105 - Recommended Erection Instructions for Steel frames.
4. SDI 111 - Recommended Details and Guidelines for Standard Steel Doors and Frames and Accessories.
5. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
6. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
7. SDI 118 - Basic Fire Door Requirements.
8. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
9. SDI 124 - Maintenance of Standard Steel Doors and Frames.

F. ANSI - American National Standards Institute (refers to most current versions of standards)
1. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.
2. ANSI/BHMA A156.1 - A156.29, and ANSI A156.31 - Standards for Hardware and Specialties
3. ANSI A250.3 - Test Procedure and Acceptance Criteria for - Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
4. ANSI A250.4 - Test Procedure and Acceptance Criteria for - Physical Endurance for Steel Doors, Frames, Frame Anchors, and Hardware Reinforcing. Product is tested and provided as Level "A", 1,000,000 cycle test criteria and other requirements as listed in these specifications.
5. ANSI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
6. ANSI/SDI A250.8/SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
7. ANSI A250.10 - Test Procedures and Acceptance Criteria for – Prime Painted Steel Surfaces for Steel Doors and Frames.
8. ANSI A250.11 - Recommended Erection Instructions for Steel Frames.

G. NAAMM - National Association of Architectural Metal Manufacturers
1. NAAMM/HMMA-840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

1.4 Submittals:
A. General:
1. Submit the following in accordance with conditions of contract and Division 01 requirements.

2. Advise Architect within the submittal package of incompatibility or issues which may detrimentally affect the work of this section.
3. Prior to forwarding submittal: Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.

B. Action Submittals:
1. Product Data: Provide illustrations from manufacturer's catalogs and data in brochure form for all products, including model, function, reinforcements, anchoring, design, finish, and options.
2. Door and Hardware Schedule: Organize schedule into spreadsheet format indicating complete designations of every item required for each door and frame. Door and hardware schedule shall clearly indicate architect's door number, elevations, and notes.
3. Shop Drawings: Drawings of openings aligning with the Door, frame, and hardware schedule in accordance with SDI 111D. Show types, quantities, dimensions, specified performance, design criteria, materials and similar data for each opening required.
   a. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, to ensure doors and frames are properly prepared and coordinated to receive specified hardware.
   b. Indicate all door elevations, internal reinforcements, and closure methods.
   c. Indicate all hardware and accessories.
4. Templates: After final approval of the door and hardware schedule, provide listing of manufacturer's hardware locations for each item of hardware.

C. Informational Submittals:
1. Qualification Data: For manufacturer, supplier, installer, and Certified Door Consultant.
   a. Supplier: A direct account of the manufacturer who has on permanent staff, an Architectural Hardware Consultant (AHC), a Certified Door Consultant (CDC) or an Architectural Openings Consultant (AOC), who will be available to consult with the Architect and Contractor regarding matters affecting the door and frame openings.
2. Product Certificates and Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by the manufacturer and witnessed by a qualified, accredited testing agency for doors and frames located in accessible routes.
   a. Evidence of manufacturer as "SDI Certified" from the Steel Door Institute.
   b. Manufacturer evidence of compliance with standards shown in 1.03 "References" section of this document.
   c. Listing Report number from an accredited testing and labeling facility (Intertek / UL) for the AHJ's reference to the tornado approval. Listing Report shall communicate design wind pressure and missile impact tests in accordance with FEMA 361 / ICC 500-2020 requirements.
   d. Report with calculations of anchoring requirements including locations and minimum required capacity from a third-party PE based on accepted engineering practice shall be made available upon request.
   e. Certificate or signed letter stating 5 years minimum experience installing labeled tornado products
   f. Certificates of compliance and installation instructions shall be made available upon request of Architect or authority having jurisdiction.
3. Warranty: As specified in this section pertaining to manufacturer, supplier, and installer.

D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include the following:
a. Complete information on care, maintenance, and adjustment; data on repair and replacement.
b. Catalog pages for each product.
c. Name, address, and phone number of local representative for each manufacturer.
d. Copy of final approved door and frame schedule, edited to reflect conditions as installed.
e. Copy of warranties including appropriate reference numbers for manufacturers to identify the project.

1.5 Quality Assurance:
A. Product Substitutions: For purpose of performing the work of this section, comply with product requirements stated in Division 01 and as specified herein.
1. Where a specific manufacturer's product is named and accompanied by the words "No Substitute," including make or model number or other designation, provide the product exactly as specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
a. Where no additional products or manufacturers are listed in a product category, requirements for "No Substitute" govern product selection.
2. Where products indicate "acceptable substitute" or "acceptable manufacturer", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
3. Substitutions: Refer to Division 01 for additional information regarding substitutions and submittals.

B. Supplier Qualifications and Responsibilities: A direct account of the manufacturer. A recognized hollow metal door and frame supplier of tornado-resistant approved systems, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying hollow metal doors and frames similar in quantity, type, and quality to that indicated for this project.
1. Engineering Responsibility: Preparation of data for field spliced or field modified units, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies like those indicated for this project.
2. Coordination Responsibility: Coordinate preparation of the door hardware and provide installation and technical data to the Architect and other related subcontractors.
a. Upon completion of hollow metal door and frame installation, inspect and verify that all components are working properly.

C. Manufacturer: Member of Steel Door Institute and is SDI Certified, with specialized capabilities manufacturing tornado-resistant opening systems complying with ICC 500-2014 and FEMA 361, and provides labeled doors and frames from a qualified, accredited testing agency, including hardware and accessories as specified in this section with minimum five years documented experience manufacturing tornado labeled systems.
1. Manufacturer Installation Instructions: Contractor shall maintain a current copy of tornado shelter storm door, frame and hardware manufacturer published installation instructions and FEMA 361/ICC 500-2020 requirements in Project Field Office and always refer to installation instructions during installation.
2. Tornado-Resistant Openings Systems: Provide complete door systems for tornado-resistant storm shelters and other areas of refuge complying and tested according to FEMA 361, Second Edition (2008), Design and Construction

Guidance for Community Safe Rooms; and ICC 500 (2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

3. Label tornado-resistant doors and frames with permanently affixed metal labels (non-Mylar) to clearly denote compliance with FEMA 361 and ICC 500-2020.
   a. Each door and frame will have its own permanent label showing what criteria the door and frame was tested in accordance with. The label will show what independent laboratory tested this assembly. The label will show test pressures both positive and negative in pounds per square foot and the design pressure both positive and negative.
   b. Doors with glass shall be etched or similarly labeled.

D. Installer Qualifications: Qualified tradesmen, skilled in the application of tornado hollow metal doors and frames that has a record of successful in-service performance for installing hollow metal doors and frames similar in quantity, type, and quality to that indicated for this project.

E. Single Source Responsibility: Obtain each type of hollow metal door and frame from a single manufacturer.

F. Fire-Rated Openings: Provide doors and frames for fire-rated openings that complies with NFPA Standard No. 80, UL10C, Category "A", Positive Pressure Test of Fire Door Assemblies, and requirements of authorities having jurisdiction. Provide only doors and frames that are labeled and listed for ratings indicated by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to the authority having jurisdiction.
   1. Affix a physical label or approved marking to each fire door or fire door frame, at an authorized facility as evidence of compliance with procedures of the labeling agency. Label embossment is not permitted.
   2. Conform to applicable codes for fire ratings. It is the intent of this specification that hardware and its application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.
   3. Fire door assemblies in exit enclosures and exit passageways; maximum transmitted temperature end point rating of not more than 250 degrees F (121 degrees C) above ambient at the end of 30 minutes of the standard fire test exposure.

G. Refer to Division 01 Section "Special Conditions" for additional information and minimum experience requirements.

1.6 Delivery, Storage, And Handling:

A. Tag each item or package separately with identification related to the final door and frame schedule and include installation instructions with each delivery.

B. Comply with manufacturer's current written instructions and recommendations.

C. Deliver doors in manufacturer's standard labeled protective packaging.

D. Accept products on site in manufacturer's packaging. Inspect for damage. Return damaged Products and replace with undamaged products.

E. Project field superintendent shall inspect products immediately upon delivery to project site, determine Product conformance with specified requirements and reject Products not complying with specifications. Project field superintendent shall direct that non-complying product be removed from project site immediately.

F. Handle, store and protect products in accordance with the manufacturers printed instructions and ANSI/SDI A250.10 and NAAMM/HMMA 840.

G. Project Conditions:
   1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

H. Protection and Damage:
   1. Promptly replace products damaged during shipping with the exact same products.
   2. Handle doors and frames in manner to avoid damage, marring, or scratching. Correct, replace, or repair products damaged during the Work.
   3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

I. Refer to Division 01 Sections "Summary of Work" and "Special Conditions" for additional information and requirements regarding stored materials.

1.7 Coordination:

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. See Division 03 for concrete, reinforcement, and formwork requirements, and Division 04 2000 "Unit Masonry".

B. Coordinate work with frame opening construction, door, and hardware installation. Coordinate work with Section 08 11 00 Steel Doors and Frames, Section 08 71 00 Finish Hardware, and other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices, and recessed items.

C. Verify field dimensions for factory assembled frames prior to fabrication.

D. Installation: Sequence installation to accommodate required door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing doors and frames to comply with indicated requirements.

E. Electrical System Roughing-In: Coordinate layout and installation of doors and frames with electrified door hardware connections.

1.8 Warranty:

A. Provide manufacturer's warranties as specified in Division 01 and as follows:
   1. Hollow Metal Doors and Frames: 1 year.
   2. Warranty does not cover damage or faulty operation due to improper installation, improper use, or abuse.

1.9 Maintenance:

A. Maintenance Instructions: Furnish a complete set of maintenance instructions as needed for Owner's continued maintenance of doors and frames.

PART 2 – PRODUCTS:

2.1 Manufacturers:

A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

B. Acceptable Manufacturer: Steelcraft, Paladin Series PW doors and FP frames.

2.2 Materials:

A. Fasteners

1. Provide fastenings, anchors and clips as required to secure hollow metal work in place. Provide and install manufacturers standard screws. Dimple metal work to receive screw heads. Set stops and other non-structural fastenings with manufacturer's standard self-tapping screws.

2.3 Steel Frames – PALADIN FP14 Series Frames:

A. Manufacturer:

1. Scheduled Manufacturer: Steelcraft.
2. Acceptable Substitute: Ceco, Curries, Republic

B. Provide 14 Gauge A60 galvannealed steel.

C. Provide tornado-resistant hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

D. Provided die-mitered corner connections to ensure tight/closed miters at head and jambs.

E. Factory prep: Welded.

F. Provide patented universal hinge preparations.

G. Provide beveled hinge and strike edges.

H. Provide 7-gauge hinge reinforcement. Provide 14-gauge full length reinforcement for continuous hinges.

I. Provide 12-gauge steel center strike reinforcement with 14-gauge head/sill strike reinforcement.

J. Provide adjustable base anchors to allow for adjustment in installation when the floor is not level.

K. Provide factory applied baked-on rust-inhibiting primer.

L. When supported by the proper signed, third-party PE reports calculating approved anchoring, provide frames anchored with or without grout fill. When using 4" face, provide frames grouted full utilizing proper grout fill protocols per SDI/ANSI 250.8.

M. Provide 14-gauge steel closer reinforcements when specified.

N. Opening sizes: Shall not exceed the smallest and largest sizes tested and approved per ICC 500-2020. Available sizes shall be publicly available on Intertek or UL listing websites.

O. Fire Rating: Where called for by the door and hardware schedules, tornado-resistant doors, frames, shutter, and glass lights shall be identified by an official metal label or etching (for glass) to signify tested approval from ITS – Warnock Hersey or Underwriters' Laboratories, to UL 10C protocols.

2.4 Steel Frames – PALADIN FP14 Shutter Systems:

A. Provide hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

B. Glass: Non-impact resistant glass (provided by others) can be installed in exterior (storm side) rabbet of frame.

C. Instructions for the installation or deployment of shutters shall be made available from the manufacturer.

2.5 Steel Frames – Anchoring:

A. Provide hollow metal frames as scheduled, and drawn and detailed on plans, with the provisions below.

B. Approved frame anchors and any necessary anchor bolts certified by third party PE reports shall be provided from the factory for concrete walls (tilt-up/prefab/poured in place) or concrete-filled CMU block walls.

C. Provide installation instructions.

D. Provide anchoring approved by UL or Intertek Testing Services / Warnock Hershey (ITS/WHI), supported by testing and third-party PE reports.

E. Grout new masonry frames full.

F. Provide frames to be used in existing masonry with tube and strap anchors welded from the factory.

2.6 Steel Doors – PALADIN PW14 Series Doors:

A. Provide tornado-resistant hollow metal doors as scheduled, and drawn and detailed on plans, with the provisions below.

B. Provide standard 14-gauge, A-60 galvannealed steel face skins for resistance against corrosion.

C. Steel stiffened core construction: Provide stiffeners welded to one face sheet and bonded to the opposite face sheet

D. Seamless, full height, mechanical interlock edges: Provide lock and hinge edges intermittently welded and filled smooth for structural support and stability the full height of the door.

E. Provide full height lock side continuous 12-gauge steel reinforcement channels at lock rails.

F. Provide 12-gauge top channel and 14-gauge bottom channel steel reinforcement.

G. Provide doors with beveled hinge and lock edges.

H. Provide universal hinge preparations.

I. Provide 7-gauge hinge reinforcements.

J. Provide 14-gauge closer reinforcements.

K. Provide factory applied baked-on rust-inhibiting primer in accordance with ANSI A250-10, with finish paint options available.

L. Provide 1-3/4-inch-thick doors.

M. Opening sizes shall not exceed the smallest and largest sizes tested and approved per ICC 500-2020. Available sizes shall be publicly available on Intertek or UL listing websites.

N. Provide handed doors and frames.

O. Provide doors beveled both hinge and lock sides.

P. Custom door undercuts shall be made available, provided they meet with the labelling agencies requirements.

Q. Follow installation instructions provided by the manufacturer. The hardware manufacturer's strike must be used. Anchor or grout bottom strikes into the foundation slab.

2.7 Tornado Glass Lights, Labeled and Non-Labeled Glazing:

A. Provide approved tornado trim and glazing pre-installed from the factory.

B. Provide installation and care instructions to maintain tornado ratings.

C. Provide glass with an etching to signify compliance from ITS – Warnock Hersey or Underwriters' Laboratories. Embossed labels are not acceptable.

D. For fire rated assemblies with glass, a UL classified fire rated sealant must be used.

2.8 Finishes:

A. Chemical Treatment: Treat steel surfaces to promote proper paint adhesion per ANSI/SDI A250.3, Test Procedure and Acceptance Criteria for Factory Applied Finished Painted Steel Surfaces for Steel Doors and Frames.

B. Factory Prime Finish: Meet requirements of ANSI A 250.10., Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

2.9 Tornado-Resistant Door Hardware And Accessories:

A. Provide approved hardware and accessories under Section 08 71 00 as part of the complete prescriptive door assembly opening by Intertek or UL public listing for the labeled tornado-resistant assembly, communicating compliance with FEMA 361 guidelines and ICC 500-2020 standards.

2.10 Fabrication:

A. Fabricate doors and frames in accordance with requirements of ANSI A250.8-2003/SDI 100.

B. Fabricate fire rated doors and frames in accordance with requirements of ITS – Warnock Hersey or Underwriters' Laboratories, with metal label on each door and frame signifying UL-10C compliance.

C. Typical Frame Reinforcing: Provide steel reinforcement as required for hardware items per manufacturers templates. Provide reinforcing per ANSI-A250.6.

D. Mortar Guards in Frames: For hinge and strike plate cutouts, provide fully enclosed pressed steel cover boxes spot welded to frames behind mortises. Additionally, for frames in masonry walls and frames being grout filled, provide metal mortar guards for any mortised cutouts.

E. Hardware Preparation at Frames: Mortise, reinforce, drill and tap as required for all mortised hardware furnished under Division 8 Finish Hardware and/or Division 26 Security in accordance with a final approved hardware schedule and templates provided by the hardware supplier and/or security supplier (including electric hinges and/or power transfers, door position switches, and other electrified hardware). Drilling and tapping for surface door closers, door closer brackets, and adjusters shall be done in field by hardware installer. Obtain templates from hardware and security suppliers. Provide hardware preparation per ANSI-A250.6.

F. Joining at Frames:
1. At welded frames with equal width jambs and head, neatly miter on face and cope and butt stops. At other welded frames, provide same mitered joint wherever possible (at intersection of jamb-head or jamb-sill) and at other locations butt metal neat. Full profile weld as specified. Fabricate so no grind marks, hollow or other out-of-plane areas are visible. At joints of intermediate members (such as mullions), provide tight joining, neatly accomplished without holes, burned out spots, weld build up or other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints. Joints shall be finished and primed.

G. Typical Door Reinforcement: Provide galvannealed steel reinforcement as required for hardware items per manufacturers' templates. Provide reinforcing per ANSI-A250.6.

H. Hardware Preparation at Doors: Mortise, reinforce, drill, and tap as required for all mortised hardware furnished under Division 08 Finish Hardware and/or Division 28 Access Control in accordance with a final approved hardware schedule and templates provided by the hardware supplier and/or security supplier (including a minimum 1/2-inch raceway for electrical hardware, electric hinges and/or power transfers, door position switches, and other electrified hardware). Obtain templates from hardware and security suppliers. Provide hardware preparation per ANSI-A250.6.

## PART 3 – EXECUTION

3.1 Examination:

A. Prior to installation of any doors and frames, examine supporting structure and conditions under which hollow metal doors and frames are to be installed. Correct all defects prior to proceeding with installation.

B. Correct unacceptable conditions are or defer to the architect or responsible building contractor to fix unacceptable conditions prior to hollow metal installation or at any point where unacceptable conditions are discovered.

3.2 Preparation:

A. Where on-site modification of doors and frames is required, prepare hardware locations in accordance with the following:
1. Tornado assemblies shall not be unduly modified. Consult with the manufacturer or the Authority Having Jurisdiction as needed to maintain the labeled approval of the tornado door system, complying with ICC 500-2020.
2. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
3. Where doors are in rated assemblies, comply with NFPA 80 for restrictions on on-site door hardware preparation.

3.3 Installation:

A. Install hollow metal in accordance with reviewed shop drawings and manufacturer's printed instructions. Securely fasten and anchor work in place without twists, warps, bulges or other unsatisfactory or defacing workmanship. Set hollow metal plumb, level, square to proper elevations, true to line and eye. Set clips and other anchors with Ramset "shot" anchors or drill in anchors as approved. Units and trim shall be fastened tightly together, with neat, uniform, and tight joints.

B. Placing Frames: Remove manufacturer's shipping spreader-bars prior to installation. These shall not be used for setting of proper frame tolerances. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set in accordance with ANSI A250.11. After wall construction is complete, remove temporary braces and/or installation spreaders leaving surfaces smooth and undamaged. In masonry construction, building-in of anchors and grouting of frames with mortar is specified in Division 04 Section - Unit Masonry. At in-place concrete or masonry construction, set frames and secure in place using countersunk bolts and expansion shields, with bolt heads neatly filled with metallic putty, ground smooth and primed.

C. Place fire-rated frames in accordance with NFPA 80, and/or manufacturer's follow-up procedure requirements.

D. Consult Hollow Metal technical data and installation instruction. The hardware manufacturer's installation instructions must be followed to maintain tornado-resistant assembly approval.

E. Where continuous hinges are specified, provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting. Apply the strip to the back of the frame, where the hinge is to be installed, to facilitate field drilling or tapping.

F. Doors with internal concealed rods and associated latches shall be installed at the factory by the door manufacturer prior to shipment to the job site. Base installation upon FEMA lock manufacturer's template and install instructions. Field installation, or supplier shop installation, of FEMA concealed internal rods and rod latches will not be accepted.

G. Door Installation: Fit hollow metal doors accurately in their respective frames, within following clearances: Jambs and head 1/8-inch, meeting edges pair of doors 1/8-inch, sill where no threshold or carpet 1/4 inch above finished floor, sill at threshold 3/4 inch maximum above finished floor, sill at carpet 1/4 inch above carpet. Place fire-rated doors with clearances as specified in NFPA 80.

H. Apply hardware in accordance with hardware manufacturers' instructions and Section 08 71 00 of these specifications. Install hardware with only factory-provided fasteners. Install silencers. Adjust door installation to provide uniform clearance at head and jambs, to achieve maximum operational effectiveness and appearance.

I. Drill and tap for surface door closers, door closer brackets, and other surface applied hardware.

3.4 Field Quality Control:

A. After installation of frames has been completed, a qualified person from the hardware installation company is to check the project to confirm the proper installation of frames to allow for the proper installation of doors and finish hardware scheduled.

B. Installer shall deliver to owner, upon completion, one set of installation and maintenance instructions for doors and frames.

C. Regular field inspection and adjustment is accepted and recommended to ensure proper latching throughout the life of the product.

3.5 Adjusting:

A. Final Adjustments: Adjust doors and hardware prior to final inspection and acceptance by the Architect and Owner. Replace defective items including doors or frames that are damaged or unacceptable to the Architect and Owner. Regular field inspection and adjustment is accepted and recommended to ensure proper latching throughout the life of the product.
   1. Adjust doors for proper operation, free from binding or other defects.
   2. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.
   3. Prime Coat / Touch up immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible, approved air-drying primer

B. Fire Door Assembly Inspection and Testing: Upon completion of the installation, provide functional testing and inspection of each fire door assembly on the project to confirm proper operation and that it meets all criteria of a fire door assembly as per NFPA 80. Inspections shall be performed by individuals who are certified by Intertek as a Fire Door Assembly Inspector (FDAI) or a credentialed Architectural Hardware Consultant (AHC). A written report using reporting forms provided by the Door and Hardware Institute shall be maintained and transmitted to the Owner and made available to the authority having jurisdiction (AHJ). The report shall list each fire door throughout the project, and include each door number, location, hardware set used and summary of deficiencies.
   1. Schedule fire door assembly inspection within 90 days of substantial completion of the project.
   2. Correct all deficiencies and schedule a re-inspection of fire door assemblies which were noted as deficient on the inspection report.
   3. Inspector shall re-inspect fire door assemblies after repairs are made.
   4. Additional re-inspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.
   5. Prime Coat Touch-Up: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

3.6 Protection:

A. Provide for the proper protection of doors and frames until the Owner accepts the project as complete. Damaged or disfigured doors and frames shall be replaced or repaired by the responsible party. Some repairs may not be allowed in the field to maintain the labeled tornado approval. Consult with the manufacturer or the Authority Having Jurisdiction.

B. Advise General Contractor on measures necessary to protect installed products and finished surfaces from damage during construction.

HARDWARE SET: TD1

SINGLE 3-8" X 7'-0" X 1 ¾" TORNADO RESISTANT STEEL DOORS AND FRAMES, WITH THE FOLLOWING HIGH IMPACT RATED DOOR HARDWARE.

EACH TO HAVE:

| | | | |
|---|---|---|---|
| 1 | CONT. HINGE | 224XY | IVE |
| 1 | MULT PT OFFICE/ENTRY | LM9350L L583-363 | SCH |
| 1 | IC CORE | AS REQUIRED | |
| 1 | MORTISE CYLINDER | AS REQUIRED | |
| 1 | SURFACE CLOSER | 4111 EDA MC TBWMS | LCN |
| 1 | WALL STOP/HOLDER | FS495* | IVE |
| 1 | GASKETING | 188SBK PSA | ZER |

DOORS, FRAMES, AND HARDWARE MUST BE SUPPLIED AS A COMPLETE SYSTEM, AS TESTED AND APPROVED, FOR COMPLIANCE WITH FEMA 361 AND ICC 500-2020 STANDARDS.
*USE "TOP OF DOOR" MOUNTING OPTION FOR FS495 WALL STOP/HOLDER.

END OF SECTION

SECTION 08531 - VINYL WINDOWS

1.0 - 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. Vinyl double-hung, fixed casement, and special shape replacement windows complete with glazing, and weather strip.

1.3 Preinstallation Meetings

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review, discuss, and coordinate the interrelationship of vinyl windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
   3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
   4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 System Description

A. Design and Performance Requirements:
   1. Window units shall be designed to comply with Performance Class: LC-PG35
      a. Units must be Alabama Building Energy Code compliant.
      b. U-Factor: 0.35 or better
      c. Solar Heat Gain Coefficient: 0.25 or better

1.5 Action Submittals

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for vinyl windows.

B. Shop Drawings: For vinyl windows.
   1. Include plans, elevations, sections, accessories and details of installation, including anchor, flashing, and sealant installation.

C. Samples: Provide manufacturers standard sample

D. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.6 Informational Submittals

A. Qualification Data: For manufacturer and Installer.

B. Sample Warranties: For manufacturer's warranties.

1.7 Quality Assurance

A. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.

C. Field verify all existing dimensions and condtions prior to fabricating windows. Advise Architect of concerning conditions. Provide custom site accordingly as required.

1.8 Delivery

A. Deliver in original packaging and protect from weather.

1.9 Storage and Handling

A. Store window units in an upright position in a clean and dry storage area above ground and protect from weather.

1.10 Warranty

A. Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date.

B. Window glass shall be warranted to be free from defects in manufacturing, materials and workmanship for period of twenty (20) years from the purchase date.

2.0 - PRODUCTS

2.1 Manufacturers

A. Source Limitations: Obtain vinyl windows from single source from single manufacturer.

B. Manufacturer: Basis of Design is Sierra Pacific 8000 series fixed and operable casement window.

C. Other manufacturers must submit product in accordance with Section 01360 - Product Substitution at least 10 days prior to bid. Acceptable product shall be notified in writing via Addendum.

2.2 Frame Description

A. Main frame shall be a multi-chambered design constructed of extruded, high impact resistant and UV stabilized, rigid polyvinyl chloride (PVC). Color: White.

B. Typical wall for extruded frame shall be .062" or as indicated on the individual extrusion die drawings

C. All screws and fastening devices shall be coated with Zinc or Cadmium in conformance with ASTM B 633-85 (1994) and / or ASTM B 766-86 (1993)

D. Frame width: 3 ¼" inches

E. Jamb depth: 1 15/16" inches

2.3 Sash Description

A. Sash components shall be a multi-chambered design constructed of extruded, high impact resistant and UV stabilized, rigid polyvinyl chloride (PVC)

B. Typical wall for extruded frame shall be .062" or as indicated on the individual extrusion die drawings

C. All screws and fastening devices shall be coated with Zinc or Cadmium in conformance with ASTM B 633-85 (1994) and / or ASTM B 766-86 (1993)

2.4 Glazing

A. Glass shall be overall ¾" thick sealed insulating unit, using warm edge spacer technology.

B. Glass type: Low E 366 w/argon
   1. U-Factor: 0.35 or better
   2. Solar Heat Gain Coefficient: 0.25 or better

2.5 Weather Strip

A. Frame Weather strip

B. All window gaps between main frame and sash members shall be weather-stripped to prevent air infiltration.

C. Weather-strip shall be a poly pile type with an integral polyethylene fin and shall conform to AAMA 701-92 and 702-92.

2.6 Fasteners

A. Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.7 Fabrication

A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze vinyl windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.8 Latching

Operable units shall be equipped with a latch release cable feature accessible within 54" of the floor

2.9 Simulated Divided Lights – (SDL)

A. Provide exterior and interior applied muntins in the pattern indicated in drawings

3.0 – EXECUTION

3.1 Examination

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Assemble and install window unit according to manufacturer's instructions and reviewed shop drawings.

D. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 079200 Joint Sealants. Do not use expansive foam sealant.

E. Install accessory items as required.

F. Use finish nails to apply wood trim and moldings.

3.3 Adjusting, Cleaning, And Protection

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
   1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Related Documents

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

### 1.2 Summary

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:
1. Architectural Hinges
2. Continuous Hinges
3. Key Control System, Cylinders and Cores.
4. Locksets, Latchsets and Deadbolts
5. Panic Devices and Fire Rated Exit Devices
6. Closers and Door Control Devices
7. Overhead Door Stops and Holders
8. Floor and Wall Stops
9. Door Bolts and Coordinators
10. Door Pulls, Push/Pull Plates and Push/Pull Sets
11. Protective Plates
12. Door Seals, Gasketing and Weatherstripping
13. Thresholds
14. Miscellaneous Door Control Devices
15. Electromechanical Hardware
16. Miscellaneous Access Control Components and Security Equipment

C. Related Sections: The following Sections contain requirements that relate to the following sections.
1. Section 08110: Hollow Metal Doors and Frames
2. Section 08215: Wood Doors
3. Section 08420: Aluminum-Framed Entrances and Storefronts
4. Section 08300: Tornado Resistant Opening Systems
5. Division 16: Electrical
6. Division 28: Electronic Safety and Security

D. Products furnished but not installed under this Section to include:
1. Cylinders for locks on entrance doors.
2. Final replacement cores and keys to be installed by Owner.

### 1.3 References

A. Standards of the following as referenced:
1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
6. UL 10C - Fire Tests Door Assemblies
7. Warnock Hersey

B. Regulatory standards of the following as referenced:
1. Department of Justice, Office of the Attorney General, *Americans with Disabilities*

*Act*, Public Law 101-336 (ADA).

2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicapped People*, 2010 edition.

1.4 Submittals

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the "Headings" of Section 3, provide catalog information for the specified items and for those submitted.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format "hardware sets" indicating complete designations of every item required for each door or opening. Use specification heading numbers with any variations suffixed a, b, etc. Include the following information:
   a. Type, style, function, size, and finish of each hardware item.
   b. Name and manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
   e. Explanation of all abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for hardware.
   g. Door and frame sizes and materials.
   h. Keying information.
   i. Cross-reference numbers used within schedule deviating from those specified.
   j. Column 1: State specified item and manufacturer.
   k. Column 2: State prior approved substituted item and its manufacturer.
2. Furnish complete wiring diagrams, riser diagrams, elevation drawings and operational descriptions of electrical components and systems, listed by opening in the hardware submittals. Elevation drawings shall identify locations of the system components with respect to their placement in the door opening. Operational descriptions shall fully detail how each electrical component will function within the opening, including all conditions of ingress and egress. Provide a copy with each hardware schedule submitted for approval. Supply a copy with delivery of hardware to the jobsite and another copy to the Owner at the time of project completion.
3. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Provide samples if requested of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.

1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after

final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

F. Contract closeout submittals:
   1. Operation and maintenance data: Complete information for installed door hardware.
   2. Warranty: Completed and executed warranty forms.

1.5 Quality Assurance

A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.
   1. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and Contractor, at reasonable times during the course of the Work.

B. Coordination Meetings:
   1. Contractor to set up and attend the following:
      a. Lock distributor to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
      b. Lock distributor and lock, closer and exit device manufacturer to meet with the installer prior to beginning of installation of door hardware. Instruct installer on proper installation of specified products.
   2. General Contractor to set up and attend the following:
   3. Meet with the Owner, General Contractor, Supplier, electrical and security contractors to coordinate all electrical hardware items. Supplier to provide riser diagrams, elevation drawings, wiring diagrams and operational descriptions as required by the General and sub-contractors.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction.
   1. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware to comply with State and local codes and UL 10C.
   2. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

D. All hardware is to comply with Federal and State Handicap laws.

E. Substitutions: Request for substitutions of items of hardware other than those listed as "acceptable and approved" shall be made to the architect in writing no later than fourteen (14) days prior to bid opening. Approval of substitutions will only be given in writing or by Addenda. Requests for substitutions shall be accompanied by samples and/or detailed information for each manufacturer of each product showing design, functions, material

thickness and any other pertinent information needed to compare your product with that specified. Lack of this information will result in a refusal.

F. Pre-Installation Coordination:
1. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.
2. Schedule a hardware pre-installation meeting on site to review and discuss the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.
3. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.
4. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

1.6 Product Handling
A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 Warranty
A. Special warranties:
1. Cylindrical Locks: Ten period Year Period
2. Door Closers: Thirty Year Period
3. Exit Devices: Three Year Period

2.0 - PRODUCTS

2.1 Manufactured Units
A. Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Bommer
c. McKinney
2. Characteristics:
a. Templates: Provide only template-produced units.
b. Screws: Provide Phillips flat-head screws complying with the following requirements:

1) For metal doors and frames install machine screws into drilled and tapped holes.
2) For wood doors and frames install threaded-to-the-head wood screws.
3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
4) Finish screw heads to match surface of hinges or pivots.

c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
1) Out-Swing Exterior Doors: Non-removable pins.
2) Out-Swing Corridor Doors with Locks: Non-removable pins.
3) Interior Doors: Non-rising pins.
4) Tips: Flat button and matching plug. Finished to match leafs.

d. Size: Size hinges in accordance with specified manufacturer's published recommendations.

e. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof, unless otherwise specified in Hardware Headings.

B. Geared Continuous Hinges:
1. Acceptable manufacturers:
a. Ives*
b. Select Products
c. Markar
2. Characteristics:
a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as scheduled.
b. All hinges are to be manufactured to template. Uncut hinges to be non-handed and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
c. Vertical door loads to be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves to be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180°.
d. Hinges to be milled, anodized and assembled in matching pairs. Fasteners supplied to be steel self-drilling, self-tapping 12-24 x ¾" screws.
e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors (suffix -FR) to meet the required ratings without the use of auxiliary fused pins or studs.

C. Cylinders and Keying:
1. Acceptable manufacturers:
a. Match existing keying system
2. Characteristics:
a. Existing System: Grandmaster key the locks to the Owner's existing system, with a new master key for the Project.
b. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated into Owner's existing system.
c. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
d. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
e. Permanently inscribe each key with number of lock that identifies

cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".

f. Key Material: Provide keys of nickel silver only.

g. Furnish the following Key Quantities:
   1) Three (3) change keys for each lock.
   2) Five (5) master keys for each master system.
   3) Five (5) grandmaster keys for each grandmaster system.
   4) Ten (10) construction master keys.
   5) Two (2) construction Control Keys.
   6) One (1) extra blank for each lock.

h. Furnish construction master keys to General Contractor.
   1) Deliver keys to Owner.

D. Mortise Locksets and Latchsets: as scheduled.
   1. Acceptable manufacturers:
      a. Schlage LM9300 Series*
   2. Required Features:
      a. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
      b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.
      c. Lever Trim: Through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: Independent break-away.
      d. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
      e. Deadbolts: Stainless steel 1-inch throw.
      f. Electric operation: Manufacturer-installed continuous duty solenoid.
      g. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
      h. Scheduled Lock Series and Design: FIELD VERIFY AND MATCH EXISTING LEVER DESIGN.
      i. Certifications:
         1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
         2) ANSI/ASTM F476-84 Grade 30 UL Listed.
      j. Mortise Locks used at ICC-500 rated door and frame assemblies are to be tested and approved for use with materials specified in Section 083490-Tornado Resistant Assemblies.

E. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled, fastened with through-bolts.
   1. Acceptable manufacturers:
      a. Schlage ND Series*
      b. Sargent 10 Line Series
      c. Corbin CL3300 Series
   2. Required Features:
      a. Chassis: Cylindrical design, corrosion-resistant plated cold-rolled steel.
      b. Locking Spindle: Stainless steel, interlocking design.
      c. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
      d. Lever Trim: Accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
      e. All lock functions: 7 year warranty, Vandalguard function outside lever is disengaged when in the locked mode.
      f. Rosettes: Minimum 3-7/16" diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
      g. Springs: Full compression type.

h. Electric operation: Manufacturer-installed continuous duty solenoid.
i. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
j. Scheduled Lock Series and Design: FIELD VERIFY AND MATCH EXISTING LEVER DESIGN.
k. Certifications:
1) ANSI A156.2, 1994, Series 4000, Grade 1. Tested to exceed 3,000,000 cycles.
2) UL listed for A label single doors up to 4 ft x 8 ft.

F. Exit Devices:
1. Acceptable manufacturers:
a. Von Duprin 98 Series*
b. Sargent 8000 Series
c. Detex Advantex Series
2. Characteristics:
a. Exit devices to be UL Listed for life safety. Exit devices for fire rated openings to have "UL" labels for "Fire Exit Hardware."
b. Exit devices mounted on labeled wood doors to be mounted on the door per the door manufacturer's requirements.
c. All trim to be thru-bolted to the lock stile case.
d. Lever trim to be solid case material with a break-away feature to limit damage to the unit from vandalism. Lever design to match locksets.
e. All exit devices to be made of brass, bronze, stainless steel, or aluminum material, powder coated, anodized, or plated to the standard architectural finishes to match the balance of the door hardware.
f. Provide glass bead conversion kits to shim exit devices on doors with raised glass beads.
g. All exit devices to be one manufacturer. No deviation will be considered.
h. All series exit devices to incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. All exit devices to be non-handed. Touchpad to extend a minimum of 1/2 of the door width and to extend to the height of the cross rail housing for a "no pinch" operation. Plastic touchpads are not acceptable. All latchbolts to be the deadlocking type. Latchbolts to have a self-lubricating coating to reduce wear. Plated or plastic coated latchbolts are not acceptable. Plastic linkage and "dogging" components are not acceptable.
i. Surface vertical rod devices to be UL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, the devices to be UL labeled for fire doors applications with rod and latch guards by the device manufacturer.
j. Exit devices to include impact resistant, flush mounted end cap design to avoid damage due to carts and other heavy objects passing through an opening. End cap to be of heavy-duty metal alloy construction and provide horizontal adjustment to provide alignment with device cover plate. When exit device end cap is installed, no raised edges will protrude.

G. Closers and Door Control Devices:
1. Acceptable manufacturers:
a. LCN Closers 4010/4110 Series*
b. Norton 9500 Series
c. Corbin Russwin DC8000
2. Characteristics:
a. Door closers to have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.

b. All closers to utilize a stable fluid withstanding temperature range of 120°F to -30°F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors to be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C.

c. Spring power to be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Spring power adjustment (LCN Fast ™ Power Adjust) allows for quick and accurate power adjustment and visually shows closer power size settings by way of dial adjustment gauge located on closer spring tube. Hydraulic regulation to be by tamper-proof, non-critical valves. Closers to have separate adjustment for latch speed, general speed and back check.

d. All closers to have solid forged steel main arms (and forearms for parallel arm closers) and where specified to have a cast-in solid stop on the closer shoe ("CUSH"). All parallel arm mounted closers to have "EDA" type arms or, where door travel on out-swing doors must be limited, use "CUSH" or "SCUSH" type closers. Auxiliary stops are not required when "CUSH" type closers are used. Provide drop plates where top rail of door is not sufficient for closer mounting. Provide "cush shoe supports" and "blade stop spacers" where dictated by frame details.

e. Overhead concealed closers to have spring power adjustable for 50% increase in closing power and fully mortised door tracks.

f. All surface closers to be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers (overhead, surface and concealed) to be of one manufacturer and carry manufacturer's ten year warranty (electric closers to have two year warranty).

g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.

h. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors to provide for corridor clear width as required by code. Where possible, mount closers inside rooms.

i. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

j. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage and to release and automatically close door under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.

k. Magnetic Door Holders to be heavy duty wall or floor mounted with metal housing and complete mounting hardware. Provide 24V holding coils unless otherwise scheduled.

l. Where specified, security closers (Series 4040XP and 146) to have heavy duty forged steel arms with special joints to prevent disassembly. All covers to be one-piece drawn metal and utilize a four point mounting. All exposed fasteners to have hex-lobular drive with a security pin.

H. Overhead Door Holders:
   1. Acceptable manufacturers:
      a. Glynn Johnson*
      b. Rixson Firemark
   2. Characteristics:

a. Provide heavy duty concealed door holders of stainless steel.
b. Provide heavy duty surface mounted door holders of stainless steel.
c. Concealed holders to be installed with the jamb bracket mortised flush with the bottom of the jamb. The arm and channel to be mortised into the door.
d. Surface holders to be installed with the jamb bracket mounted on the stop.

I. Floor Stops and Wall Bumpers:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics: Refer to Hardware Headings.

J. Push Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Exposed Fasteners: Provide manufacturers standard exposed fasteners.
b. Material to be forged stainless steel, per the Hardware Headings.
c. Provide plates sized as shown in Hardware Headings.

K. Door Pulls & Pull Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide concealed thru-bolted trim on back to back mounted pulls, but not for single units.
b. Material to be forged stainless steel.
c. Provide units sized as shown in Hardware Headings.

L. Push Pull Sets:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide mounting systems as shown in hardware sets.
b. Material to be tubular stainless steel.
c. Provide Push/Pull sets sized as shown in Hardware Headings.

M. Protective Plates:
1. Acceptable manufacturers:
a. Ives*
b. Trimco
c. Rockwood Manufacturing
2. Characteristics:
a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
b. Materials:

c. Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
d. Fabricate protection plates not more than 2 inches less than door width on push side and not more than 1 inch less than door width on pull side.
e. Sizes:
1) Refer to hardware headings for specific sizes.
2) Kick plates and Mop plates to be 1" less that bottom rail height where applicable.

N. Thresholds:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. Pemko
c. Reese Industries
2. Types: Indicated in Hardware Headings.

O. Door Seals/Gasketing:
1. Acceptable manufacturers:
a. Zero Weatherstripping Co., Inc.*
b. Pemko
c. Reese Industries
2. Types: Indicated in Hardware Headings.

P. Silencers:
1. Acceptable manufacturers:
a. Ives*
b. Hager
c. Rockwood Manufacturing
2. Provide three for each single door; two for each pair of doors.

Q. Knox Box:
1. Acceptable manufacturers:(AS REQUIRED)
a. Knox Box 3200 Series.
2. Provide one surface mount Knox Box 3200 Series.
3. Provide unit compatible with the local Fire Department Knox key system.
4. General contractor shall install in location provided by architect.

2.2 Materials and Fabrication

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other

work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
4. Use thru-bolts for installation of all exit devices, closers, and surface-mounted overhead stops. Coordinate with wood doors and metal doors and frames. Where thru-bolts are used, provide sleeves for each thru-bolt as a means of reinforcing the work, or provide sex nuts and bolts.

2.3 Hardware Finishes

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

F. FIELD VERIFY AND MATCH EXITING HARDWARE FINISH.

3.0 - EXECUTION

3.1 Installation:

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
   1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
   2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
   3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers".

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 Adjusting, Cleaning, and Demonstrating

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service:

1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
3. File written report of this inspection to Architect.

3.3 Hardware Schedule

HARDWARE SET: A
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 6 | HINGE | 5BB1HW 4.5 X 4.5 NRP 630 | IVE |
| 1 | REMOVABLE MULLION | KR4954 STAB | VON |
| 1 | PANIC HARDWARE | CD-98-DT-SNB | VON |
| 1 | PANIC HARDWARE | CD-98-NL-SNB | VON |
| 1 | RIM CYLINDER | AS REQUIRED | |
| 4 | IC CORE | AS REQUIRED | |
| 3 | MORTISE CYLINDER | AS REQUIRED | |
| 2 | SURFACE CLOSER | 4111 EDA MC TBWMS | LCN |
| 2 | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 2 | WALL STOP | WS401/402CVX | IVE |
| 1 | MULLION SEAL | 139N PSA | ZER |
| 1 | GASKETING | 8144SBK PSA | ZER |
| 2 | DOOR SWEEP | 8198AA | ZER |
| 1 | THRESHOLD | 65A-223 | ZER |

HARDWARE SET: B
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 3 | HINGE | 5BB1HW 4.5 X 4.5 NRP 630 | IVE |
| 1 | PANIC HARDWARE | CD-98-NL-SNB | VON |
| 1 | RIM CYLINDER | AS REQUIRED | |
| 2 | IC CORE | AS REQUIRED | |
| 1 | MORTISE CYLINDER | AS REQUIRED | |
| 1 | SURFACE CLOSER | 4111 EDA MC TBWMS | LCN |
| 1 | KICK PLATE | 8400 10" X 2" LDW B-CS | IVE |
| 1 | WALL STOP | WS401/402CVX | IVE |
| 1 | GASKETING | 8144SBK PSA | ZER |
| 1 | DOOR SWEEP | 8198AA | ZER |
| 1 | THRESHOLD | 65A-223 | ZER |

HARDWARE SET: C
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 6 | HINGE | 5BB1HW 4.5 X 4.5 NRP | IVE |
| 2 | FIRE EXIT HARDWARE | 9827-L-F-2-LBR-17-499F-SNB | VON |
| 4 | RIM CYLINDER | AS REQUIRED | |
| 4 | IC CORE | AS REQUIRED | |
| 2 | SURFACE CLOSER | 4111 EDA MC TBWMS | LCN |
| 2 | MAGNET | SEM7850 12V/24V/120V | LCN |
| 2 | MEETING STILE | 328AA-S (PAIR) | ZER |
| 1 | GASKETING | 8144SBK PSA | ZER |

HARDWARE SET: D
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 3 | HINGE | 5BB1 4.5 X 4.5 | IVE |
| 1 | CORRIDOR LOCK | ND50 | SCH |
| 1 | CYLINDER/CORE | AS REQUIRED | |
| 1 | SURFACE CLOSER | 4011 MC TBWMS | LCN |
| 1 | KICK PLATE | 8400 8" X 2" LDW B-CS | IVE |
| 1 | WALL STOP | WS401/402CVX | IVE |
| 1 | GASKETING | 188SBK PSA | ZER |

HARDWARE SET: E
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 3 | HINGE | 5BB1 4.5 X 4.5 | IVE |
| 1 | CLASSROOM LOCK | ND70 | SCH |
| 1 | CYLINDER/CORE | AS REQUIRED | |
| 1 | OH STOP | 90S | GLY |

PROVIDE L9080L FOR MECHANICAL SPACE, PROVIDE L9070L FOR CLOSET SPACE.

HARDWARE SET: F
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 3 | HINGE | 5BB1 4.5 X 4.5 | IVE |
| 1 | CLASSROOM LOCK | ND70 | SCH |
| 1 | CYLINDER/CORE | AS REQUIRED | |
| 1 | OH STOP | 90S | GLY |

HARDWARE SET: G
EACH TO HAVE:

| | | | |
|---|---|---|---|
| 3 | HINGE | 5BB1 4.5 X 4.5 | IVE |
| 1 | PRIVACY LOCK | ND40 | SCH |
| 1 | SURFACE CLOSER | 4011 MC TBWMS | LCN |
| 1 | MOP PLATE | 8400 6" X 1" LDW B-CS | IVE |
| 1 | KICK PLATE | 8400 8" X 2" LDW B-CS | IVE |
| 1 | WALL STOP | WS401/402CVX | IVE |

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work under this section consists of all glass and glazing.

1.2 Quality

A. Glazing shall be provided to comply with Table 5.3.1 Building Envelope Requirements - Climate Zone 1 of the Alabama Building Energy Conservation Code, and the 2021 International Building Code.

B. Glazing for Fire-Rated Door and Window Assemblies: Glazing tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labeled per requirements of authorities having jurisdiction.

C. Safety Glazing Products: Comply with size, glazing type, location, and testing requirements of 16 CFR 1201 for Category I and II glazing products, and requirements of authorities having jurisdiction.

D. Glazing Industry Publications: Comply with glass product manufacturers' recommendations and the following:

1. GANA Publications: GANA Laminated Division's 'Laminated Glass Design Guide' and GANA's 'Glazing Manual.'
2. IGMA Publication for Insulating Glass: IGMA TM-3000, 'Glazing Guidelines for Sealed Insulating Glass Units.'

E. Insulating-Glass Certification Program: Indicate compliance with requirements of Insulating Glass Certification Council on applicable glazing products.

1.3 Samples

Submit for approval samples of each kind of glass required. Each sample shall bear a label indicating the kind and quality of the glass and the manufacturer. **Only 1 sample each is required.**

1.4 Warranty

A. Warranty for Coated-Glass Products: Manufacturer's standard form, signed by coated-glass product primary manufacturer or manufacturer/fabricator, as applicable, agreeing to replace coated-glass units that display peeling, cracking, and other deterioration in metallic coating under normal use, within 10 years of date of Substantial Completion.

B. Warranty for Laminated Glass: Manufacturer's standard form, signed by laminated-glass product manufacturer/fabricator, agreeing to replace laminated-glass units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C 1172, within five years of date of Substantial Completion.

C. Warranty for Insulating Glass: Manufacturer's standard form, signed by insulating-glass product manufacturer/fabricator, agreeing to replace insulating-glass units that exhibit failure of hermetic seal under normal use evidenced by the obstruction of vision by dust, moisture, or film on interior surfaces of glass, within 10 years of date of Substantial Completion.

D. Installer's Warranty: Form acceptable to Owner, signed by glass product Installer, agreeing to replace glass products that deteriorate, or that exhibit damage or

deterioration of glass or glazing products due to faulty installation, within 2 years of date of Substantial Completion.

## 2.0 - PRODUCTS

2.1 Manufacturer

Glass products shall be as manufactured by Vitro Architectural Glass., Guardian Industries, Inc., or Pre-approved equal. Laminated pattern glass shall be as manufactured by North American Glass Fabrication. Fire-rated, safety-rated wired glass shall be manufactured by Technical Glass Products, Pilkington or SaftFirst.

2.2 Materials

Glass shall be as defined in, and in accordance with Code of Federal Regulations 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

A. Compound for face glazing, or where shown or indicated as compound shall be an oleo-resinous knife grade elastic glazing compound such as Tremco's Trem-glaze, Pecora's M-242, or Dap-1012.

B. Sealant where shown or indicated shall be Tremco "Mono," Dow Corning 780, or GE's construction sealant.

C. Tape where shown or indicated shall be Tremco's 440 Tape, Curtis 606 Tape, or Warflex's "Sealing Tape."

D. Neoprene setting blocks as approved by glass manufacturer Shore "A" Hardness approximately 70 to 90.

E. Neoprene spacer shims as approved by glass manufacturer Shore "A" Hardness approximately 40 to 60.

F. Neoprene glazing beads as approved for aluminum store front and doors.

G. Color of compound, sealant, tape, etc. shall be as selected.

H. Glare reducing glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected.

I. Glare reducing Tempered Safety glass shall be 1/4" thick Solargray, Solargreen, or Solarbronze as selected. When multiple small glass panes are used in the same door or sidelight, provide one (1) only Decal and furnish certificate verifying the use of Safety Glass in other panels.

J. Interior Tempered Safety Glass shall meet 16CFR1201 Test Requirements, Cat. 1 and/or Cat. 2 as applicable. Etch label and furnish certificate verifying the use of Tempered Safety Glass.

K. Fire safety glass shall be 5/16" thick clear laminated fire rated and impact safety rated glass. Approved equal to Pilkington Fire-Lite Plus or SaftiFirst SuperLite and shall meet impact safety rating 16CFR1201 (Cat.1) if less than 9 sq. ft. and (Cat. 2) if greater than 9 sq. ft. Provide with label at all rated doors and frames..

L. 1" insulating Glass - Pre-assembly Low-E unit consisting of 1/4" float glass exterior lite, 1/2" dehydrated air space and clear 1/4" float glass with Low-E interior lite meeting performance requirement for Class A or Class B Accelerated Test as

specified in ASTM E744 with no visible fog. Match color on metal spacer to glazing frame. As selected by Architect. Provide minimum SHGC of .25.

1. Solarban 70 Solar Gray + Clear
2. Solarban 60 Solar Gray + Clear
3. Solarban 70 Solar Bronze + Clear

*(See corresponding SHGC and U-Value below when used with metal frame)*

M. Spandrel Glass - 1/4" thick, float glass with the opacifying coating on the number 2 (inboard) face. Temper or heat strengthen in accordance with the current Glass Tempering Association, Engineered Standard Manual. Opacifying coating shall be Opaci-Coat-300 Coating shall be Silicone water based glastomer with a min/max wet thickness of 8 mils. (0.008") and a protective coating of silicone rubber a minimum wet thickness of 13 mils (0.0013"). Color as selected by Architect. Provide minimum SHGC of .25.

| | | |
|---|---|---|
| 1. | Solarban 70 Solar Gray + Clear | 3-1870 "Solar Moon" |
| 2. | Solarban 60 Solar Gray + Clear | 3-1371 "West Lake" |
| 3. | Solarban 70 Solar Bronze + Clear | 4-2100 "Beach Bronze" |

*(See corresponding SHGC and U-Value below when used with metal frame)*

**"CENTER OF GLASS"**

| | **SHGC** | **U-VALUE** |
|---|---|---|
| 1. | 0.20 | 0.28 |
| 2. | 0.25 | 0.29 |
| 3. | 0.21 | 0.28 |

## 3.0 - EXECUTION

### 3.1 Preparation

A. Immediately prior to glazing, all surfaces shall be wiped clean and free of protective coatings, moisture, and dust. All glazing shall be done when the temperature is 35° F or above.

B. All sash shall be checked prior to glazing to make certain that the opening is square, plumb, and secured in order that uniform face and edge clearances are maintained. Inspect all butt and miter joints. If these joints are open, they shall be sealed with sealant prior to glazing. All ventilators shall be properly adjusted. Maintain 1/8" minimum bed clearance between glass and sash on both sides.

C. All glass indicated in non-rated doors shall be tempered with etched label.

D. All glass indicated in rated doors shall be fire safety glass with etched label.

### 3.2 Setting

A. Glazing preparation and procedures shall be as outlined in the Glazing Manual of the Flat Glass Jobbers Association.

B. Glass shall be set without springing, and with an equal bearing the entire width and length of each piece.

C. The actual sizes required shall be determined by measuring the frames to receive the glass. All glass shall be factory labeled.

D. Glass shall be properly cut and set in accordance with the best practice of the trade.

E. Center glass in glazing rabbet to maintain recommended clearances at perimeter for expansion and contraction, each face of glass.

3.3 Protection

Immediately after installation, a marker letter shall be placed upon each pane of glass for protection against careless breakage. All broken, cracked, scratched, or otherwise damaged glass shall be replaced.

3.4 Cleaning

A. Upon completion of the project, all glass shall have paint, dirt, and other stains removed; glass shall then be washed clean and polished.

B. Labels on glass shall not be removed until final approval is obtained, and glass is ready for cleaning.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work of this section consists of the furnishing and erection of all metal studs and gypsum wall board, finished ready for field decoration.

1.2 Submittals

A. Submit manufacturer data, samples and shop drawings.

1.3 Applicable Standards

Current editions or revisions of Federal and ASTM standards shall apply unless specifically noted otherwise.

1.4 Delivery and Storage

All materials shall be delivered to the job in original unopened containers or bundles and stored in a place protected from the elements and damage.

## 2.0 - PRODUCTS

2.1 Materials

A. Interior wall metal studs shall be cold rolled "Cee" design 25-gauge steel, prepared to receive self-drill, self-tapping screw fasteners. Metal studs web shall be punched to facilitate work of other crafts. At interior wall with plumbing, provide metal stud framing wide enough to fully conceal plumbing work.

B. Exterior wall metal studs shall be 3-5/8" 20-gauge metal studs and runners, welded system, unless noted otherwise. At all areas to receive masonry veneer, use 18-gauge metal studs and runners.

C. Track shall be of proper dimension to receive metal studs and provide a close friction fit.

D. Metal studs and track shall be hot-dipped galvanized.

E. Wall board shall be a mill fabricated gypsum board consisting of a core of processed gypsum rock encased in a heavy mineral finished paper on the face side and a strong liner paper on the back side. The face paper shall be folded around the long edges to reinforce and protect the core and the ends shall be square cut and smooth finish. Thickness shall be as indicated on the Drawings but not less than 5/8".

F. Fire resistant wall board shall be a board having a specifically formulated core which shall meet Underwriter's Laboratory tests for a one-hour fire resistant rating. Material shall be equal to USG Sheetrock® Brand Ultralight Panels Fire code® X as manufactured by U.S. Gypsum, Fire-Shield® LITE® as manufactured by National Gypsum, Fireguard® by Georgia-Pacific.

G. Moisture- and Mold-resistant, Fire-resistant Gypsum Core shall be 5/8" thick Fire code equal to SHEETROCK® brand MOLD TOUGH™ FIRECODE® .

Provide at all walls subject to moisture and/or at walls behind drinking fountains, sinks, lavatories, urinals, water closets, and all other plumbing fixtures where drywall is indicated.

H. For High Impact Areas as indicated provide USG Sheetrock® Brand Mold Tough® VHI Firecode® X Panels or pre-approved equal that meets testing requirements for High Impact. The main ASTM standard for abuse classification is **ASTM C1629** which specifies the levels of performance. Annex A1 describes test methods for testing products for Hard Body Impact Resistance.

**ASTM C1629** makes reference to three other test methods for abuse resistance: **ASTM E695** for Soft Body Impact, **ASTM D4977** for Abrasion resistance, **ASTM D 5420** for Indentation Resistance.

I. Runner channels shall be hot-rolled or cold-rolled steel and shall be galvanized or given a coat of rust-inhibitive paint. Runner channels shall be one and one-half inches (1-1/2") with flange approximately one-half inch (1/2") deep, spaced not over forty-eight inches (48") on centers. Hot Rolled Channel shall weigh not less than 850 pounds per 1,000 lineal feet; cold rolled channel shall weigh not less than 475 pounds per 1,000 feet.

J. Fasteners shall be flat, countersunk head drywall screws, USG Type S or as approved, or annular nails for use with nailer bars or for wood.

K. Trim shall be hot dip galvanized steel, corner bead, casing, and expansion strips.

L. Joint tape shall be a heavy perforated cross fibered reinforced paper.

M. Joint cement shall be a bedding and finishing cement especially prepared for use with reinforcing joint tape.

N. Metal accessories shall be provided at all exterior corners, where a horizontal surface abuts a vertical surface or where an exposed edge of the wallboard abuts metal. Material shall be as manufactured by or as recommended by the manufacturer of the wall board used.

O. Control joints shall be provided at all corners, intersections, ceilings, etc., subject to movement. Install control joints in areas as recommended by manufacturer and/or as indicated on drawings.

2.2 Auxiliary Materials

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

## 3.0 - EXECUTION

3.1 A. Floor and ceiling tracks aligned accurately according to partitions layout and anchored securely into structural floor and overhead structure at maximum of 16" o.c. All walls shall extend to underside of deck above.

B. Studs spaced not greater than 16" o.c. for gypsum board, anchored securely to floor and ceiling tracks. Set studs approximately 2" from abutting partitions or walls at corners, openings and ends of partitions. Anchor door bucks to adjacent studs.

C. Partitions shall be rigid, sound and plumb with all necessary metal trim, clips and accessories for a complete installation.

D. Gypsum board shall be applied in single layer or multiple layers as indicated on the Drawings by screw application to metal studs with joints taped and filled with manufacturer's recommended joint compound.

E. Application of gypsum board and joint finishing shall not begin under cold or damp conditions. The temperature shall be a minimum of $35^0$ before work is begun and shall be maintained at this level or above until the joint cement is set dry and hard. Adequate ventilation shall be provided at all times.

F. Installation shall be in full accord with the recommendations of the manufacturer. Workmanship shall be by competent workmen experienced in the installation of wall board and all work shall be done in accordance with the best practices of the trade to give a smooth, straight, aligned surface which is ready for the finish.

G. Apply metal trim at exposed edges.

H. Neatly cut all openings so that they may be covered by plates and escutcheons.

I. Vertical Furring - All vertical furring in ceiling shall be of 5/8" fire rated gypsum board on metal framing. DO NOT furr with acoustical panels.

3.2 Drywall Finish

A. Temperature and Humidity Conditions
Do not install joint treatment compounds unless installation areas comply with the minimum temperature and ventilation requirements recommended by the manufacturer and conditions are acceptable to the installer.

B. Finish exposed drywall surfaces with joints, corners, and exposed edges reinforced or trimmed as specified, and with all joints, fastener heads, trim accessory flanges and surface defects filled with joint compound in accordance with manufacturer's recommendation for a smooth, flush surface. Drywall finishing work will not be considered acceptable if corners or edges do not form true, level or plumb lines, or if joints, fastener heads, flanges of trim accessories or defects are visible after application of field-applied decoration.
1. Refer to ASTM 6840 for guidelines for acceptable levels of finish.
   a. Finish Level shall be no less than Level 3 for all exposed Gypsum Board.

C. Joint and Corner Reinforcing
1. Use joint tape to reinforce joints formed by tapered edges or butt ends of drywall units and at interior corners and angles. Set tape in joint compound then apply skim coat over tape in one application.

2. Where open spaces of more than 1/16" width occur between abutting drywall units (except at control joints), prefill joints with joint compound and allow prefill to dry before application of joint tape.

3. Provide control joints as recommended by manufacturer.

D. Reinforce external corners of drywall work with specified type of corner bead.

Securely fasten metal corner beads as recommended by the manufacturer. Do not use fasteners which cannot be fully concealed by joint compound fill applied over flanges.

E. Edge Trimming
Provide specified type of metal casing bead trim. Install in single unjointed lengths unless run exceeds longest available stock length. Miter corners of semi-finished type trim. Coordinate installation of trim continuously with drywall installation.

F. Application of Joint Compounds
Use only compatible compounds from one manufacturer. After mixing, do not use joint compounds if recommended pot-life time has expired. Allow drying time between applications of joint compound in accordance with manufacturer's recommendations for the relative humidity and temperature levels at the time of application. In no case, allow less than 24 hours drying time between application to joint compound. Apply not less than 3 separate coats of joint compound over joints, fastener heads, and metal flanges. Joint compound treatment is not required at non-fire rated walls above suspended ceiling where partitions/walls are shown or specified to extend to structural deck or ceiling above suspended ceiling.

G. LEVELS OF FINISH. The following levels of finish are established as a guide for specific final decoration. The minimum requirements for each level shall be as described herein

1. Level 4:
All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Two separate coats of joint compound shall be applied over all flat joints and one separate coat of joint compound shall be applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: It is recommended that the prepared surface be coated with a drywall primer prior to the application of final finishes. See painting/wallcovering specification in this regard.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Summary

A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
1. Porcelain Tile
2. Ceramic Tile
3. Quarry Tile
4. Glass Tile
5. Specialty Tile
6. Installation Products; adhesives, mortars, grouts and sealants
7. Waterproof membranes
8. Crack Isolation membranes
9. Thresholds, trim, cementitious backer units and other accessories specified herein.
10. Tile and grout care and maintenance recommendations.

### 1.2 References

A. American National Standards Institute (ANSI):
1. A108.1 - Installation of Ceramic Tile in a Mortar Bed
2. A108.5 - Installation of Ceramic tile with Dry-Set Portland Cement or Latex-Portland Cement
3. A108.10 - Installation of Grout in Tile work
4. A108.13 - Installation of Membranes for Thin-Set Ceramic Tile
5. A118.3 - Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive
6. A118.4 - Latex-Portland Cement Mortar
7. A 118.5 - Chemical-Resistant Furan Mortar and Grout.
8. A118.6 - Ceramic Tile Grouts
9. A118.7 - Polymer Mortified Cement Grouts
10. A118.10 – Load-Bearing, Bonded Waterproofing Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations
11. A136.1 - Organic Adhesives for Installation of Ceramic Tile
12. A137.1 - Ceramic Tile

B. American Society for Testing and Materials (ASTM):
1. C 136 - Sieve Analysis of Fine and Coarse Aggregates
2. C 144 - Aggregate for Masonry Mortar
3. C 150 - Portland Cement
4. C 207 - Hydrated Lime for Masonry Purposes
5. C 373 - Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
6. C 503 - Marble Dimensional Stone (Exterior)
7. C 623 – Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramics by Resonance
8. C 627 – Robinson Floor Test for Tile Service Level
9. C 847-95 Metal Lath
10. C 933-96a Welded Wire Lath
11. C 1028 - Static Coefficient of Friction of Ceramic Tile and Other like Surfaces by the Horizontal Dynamometer Pull-Meter Method

12. D 87 - Melting Point of Petroleum Wax (Cooling Curve)
13. D 226 - Asphalt Saturated Organic Felt Used in Roofing and Waterproofing
14. D 4397 - Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
15. E-90 and E-413 for STC (Sound Transmission Class), E-492 and E-989 for IIC (Impact Insulation Class) – Sound Deadening Underlayments

C. TCA Handbook for Ceramic Tile Installation by Tile Council of America, latest edition

1.3 Submittals

A. Submit shop drawings, product data, and samples under provisions of Section 01350.

B. Shop Drawings:
1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, and setting details.
2. Locate and detail expansion and control joints.

C. Submit product data, specifications, and instructions for using mortars, adhesives and grouts.

D. Samples:
1. Submit color samples illustrating full color range of each type tile.
2. Grout: Submit manufacturer's full range of standard and designated color samples for each type for Architect's selection.

E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Manufacturer's and installer's qualification data.
3. Manufacturer's instructions.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.4 Quality Assurance

A. Single Source Responsibility:
1. Obtain each type and color tile material required from single source.
2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
3. Furnish a 10 year guarantee from installation material manufacturer. The guarantee is inclusive of installation materials, finish product, and labor.
4. Obtain prefabricated edge protection and transition and movement profiles from one manufacturer to ensure compatibility.
5. Obtain membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.

B. Manufacturer Qualifications:
1. Tile: Minimum 5 years experience in manufacture of tile products.
2. Setting Materials: Minimum 10 years experience in manufacture of setting and grout materials specified.

C. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.

D. Certifications:
   1. Maintain one copy each of all Referenced standards and specifications on site. Include the TCA Handbook, ANSI A108 Series, ANSI A118 Series ANCI A136.1 and ANSI A137.1 and others as specified under paragraph References.
   2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended use.

E. Conform to ANSI- Recommended Standard Specifications for Ceramic Tile - A137.1.

F. Conform to TCA Ceramic Tile: The Installation Handbook.

1.5 Delivery, Storage, and Handling

A. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type, and grade.

B. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.

C. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.

D. Protect mortar and grout materials against moisture, soiling, or staining.

1.6 Environmental Requirements

A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.

B. Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with "after occupancy" conditions for a minimum of 2 weeks.

C. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation nor more than 100 degrees F.

D. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

1.7 Warranty

A. Special Project Warranty: Submit a written warranty, executed by the Contractor, Installer, and Manufacturer, agreeing to repair or replace tile that fails in materials or workmanship within the specified warranty period.
   1. Warranty Period: 1 year after date of Substantial Completion.

1.8 Extra Materials

A. At completion of project, deliver to Owner extra stock of materials used on project as follows:
   1. Provide 10% of each size, color, and surface finish of tile.
   2. Six lineal feet of each color and type of base.

B. Store in location as directed by Owner.

C. Ensure materials are boxed and identified by manufacturer, type, and color.

1.9 Maintenance Data

A. Submit maintenance data under provisions of Section 01910.

B. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.

2.0 - PRODUCTS

2.1 Manufacturers

A. Acceptable Manufacturer: Dal-Tile Corporation or pre-approved equal.

B. Requests for substitutions will be considered in accordance with provisions of Section 01360 received 10 days prior to bid.

2.2 Products

A. Porcelain Floor Tile
   1. Manufacturer: American Olean
   2. Product: Unglazed Mosaic
   3. Color: See Finish Schedule
   4. Size: See Finish Schedule
   5. Edge: See Finish Schedule
   6. Finish: See Finish Schedule
   7. Pattern: As indicated on drawings.
   8. Trim Units: Matching bead, bullnose, cove, and base shapes in sized coordinated with field tile.

2.3 Setting Materials

A. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.

B. Epoxy Adhesive: ANSI A118.3, thinset bond type.

C. Mortar Bed Materials:
   1. Portland cement: ASTM C150, type 1, gray or white.
   2. Hydrated Lime: ASTM C207, Type S.
   3. Sand: ASTM C144, fine.
   4. Latex additive: As approved.
   5. Water: Clean and potable.

D. Mortar Bond Coat Materials:
   1. Dry-Set Portland Cement type: ANSI A118.1.
   2. Latex-Portland Cement type: ANSI A118.4.
   3. Epoxy: ANSI A118.3, 100 percent solids.

E. Epoxy Grout: ANSI A118.8, 100 percent solids epoxy grout; color to be selected.

F. Waterproofing Membrane at Floors: Membrane in accordance with ANSI A118.10.

G. Membrane at Walls: No. 15 (6.9 kg) asphalt saturated felt, ASTM D226, Type

H. Membrane at Walls: 4 mil (0.1 mm) thick polyethylene film, ASTM D4397.

I. Membrane at Walls: Reinforced asphalt paper.

J. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced with 2 inch (50 mm) wide coated glass fiber tape for joints and corners:
   1. Thickness: 1/2 inch (13 mm).

2.4 Miscellaneous Materials

A. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout, is compatible with tile and mortar/grout products, and is easily removable after grouting is completed without damaging grout or tile.

   1. Petroleum paraffin wax, fully refined, tasteless, odorless, containing at least 0.5 percent oil with a melting point of 120-degree F to 140-degree F 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 a temporary protective coating for tile.

2.5 Finishing Edge Protection Profiles

A. Manufacturer - Schluter Systems or pre-approved equal. Comply with Section 01360 - Product Substitution and submit at least 10 days prior to Bid. All other approved products shall be notified in writing via addendum.

B. Products:
   1. Schluter: Deco Radius
   2. Corners provide matching outside corners as required.
   3. Material and Finish: Satin anodized aluminum.
   4. Height as required
   5. Location as noted on drawings

2.6 Mixing Mortar and Grout

Mix mortars and grouts in accordance with manufacturer's instructions.

## 3.0 - EXECUTION

3.1 Examination

A. Verify that all wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive.

B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and float within tolerances specified in ANSI A137.1.

C. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.2 Preparation

A. Clean substrates.

B. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to application of tiles.

C. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.

D. Acid Based Cleaners: Use not permitted.

E. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.

F. Do not seal substrate unless required by manufacturer.

G. Prime substrate when required by manufacturer.

H. Membrane
1. Flash membrane up adjacent walls and restraining surfaces.
2. Use preformed cove, corners, and expansion joint flashing.
3. Allow membrane to cure as prior to setting tile.
4. Do not allow construction traffic on membrane.

I. Apply primer-sealer to wood and plywood subfloors when recommended by setting materials manufacturer.

J. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in 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.

K. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
1. Petroleum paraffin wax or grout release.

3.3 Installation

A. Cement Board Substrate
1. Place rough side out and fasten with galvanized or resin coated gypsum board screws at 8 inches on center in field of panel and at 6 inches on center at edges.
2. Provide 1/4 inch gap above floor or fixture lip for flexible calking.
3. Maintain manufacturer's required space between board edges.
4. Fill joints by applying tile setting material and joint reinforcement.

B. Vapor Retarder:
1. Extend vapor retarder to extremities of areas indicated to be protected from vapor transmission.
2. Secure in place with mechanical fasteners or adhesives.
3. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
4. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs.
5. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners no greater than 16 inches apart.
6. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape.
7. Repair tears and punctures in vapor retarder immediately before concealing it with the installation of cementitious backer units.

C. Membrane:
1. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.
2. Flash membrane to cure prior to setting tile.
3. Do not allow construction traffic on membrane.

D. Crack Isolation Membrane
1. Install crack isolation membrane over cracks of up to 1/8 inch or greater in substrates. Apply a 12 inch wide strip centered on crack. Install in accordance with manufacturer's recommendations.
2. Install membrane with products or methods approved in writing by membrane manufacturer when joining, sealing, fastening, or adhering sheet membranes.

E. Waterproofing
1. Install waterproofing in strict compliance with manufacturer's instructions.
2. Flash waterproofing up adjacent walls in accordance to manufacturer's details, to a height of 4 inches.
3. Flood test waterproof membranes after fully cured.
4. Field Quality Control water test when required.

F. Tile Installation, General
1. Install tile materials in accordance with ANSI A137.1, other referenced ANSI and TCA specifications, and TCA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.

2. Cut and fit tile tight to protrusions and vertical interruptions and treat with a compatible sealant as specified in Section 07900
3. Form corners and bases neatly.
4. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joint watertight, without voids, cracks, excess mortar, or grout.
5. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of America.

G. Layout

1. Lay out work to pattern indicated so that full tile or joint is centered on each wall and no tile of less than half width need be used. Do not interrupt pattern through openings. Lay out tile to minimize cutting and to avoid tile less than half size.
2. For heights stated in feet and inches, use courses of full tile to produce nearest attainable heights without cutting tile.
3. No staggered joints will be permitted.
4. Align joints in tile in both directions.
5. Align joints between floor and base tile.
6. Make joints between sheets of tile exactly same width as joints within sheet.
7. File edges of cut tile smooth and even.
8. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
9. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
10. Accurately form intersections and returns.
11. Form internal angles coved and external angles bullnosed.

H. Thin Set Method, Floors and Walls

1. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Maintain 90 percent coverage on back of tile and fully bed all corners.
2. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
3. When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive onto back of each tile or sheet of tiles.
4. Set tiles in place and rub or beat with small beating block.
5. Beat or rap tile to ensure proper bond and also to level surface of tile.
6. Align tile to show uniform joints and allow to set until firm.
7. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.
8. Allow face mounted tile to set until firm before removing paper and before grouting.
9. Sound tile after setting. Replace hollow sounding tiles.

I. Thick Bed Method, Horizontal Surfaces

1. Apply slurry bond coat approximately 1/16 inch thick to substrate surface using flat trowel.
2. Place thick bed mortar, 1-1/4 inch thick nominally onto slurry bond coat while coat is still wet and tacky.

3. Spread prepared mortar approximately one-half desired bed thickness and then lay reinforcing mesh.
4. Lap wire 3 inches and place additional mortar on top of wire to bring bed to required thickness.
5. Rod and compact mortar with steel trowel.
6. Before placing tiles on green or wet screed bed, apply slurry bond coat approximately 1/16 inch thick to mortar using flat trowel.
7. Apply mortar skim coat to back of each tile or sheet of tile immediately prior to placing on bed.
8. Place tiles in wet slurry coat before surface dries maintaining uniform joints.
9. After each tile or sheet of tiles is laid, beat tile with wooden block or rubber mallet to level surface and embed tiles.
10. Perform beating before mortar takes initial set.
11. Pitch surface to drain where required.
12. On hardened screed or mortar bed, install tiles by thin bed method.
13. Sound tiles after setting. Replace hollow sounding tiles.
14. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.

J. Grouting
1. Allow tiles to set a minimum of 48 hours before grouting.
2. If bonding materials are rapid setting, follow manufacturer's recommendations.
3. Install in accordance with grout manufacturer's recommendations and ANSI A108.10.
4. Pack joints full and free before mortar takes initial set.
5. Clean excess grout from surface with wet cheesecloth as work progresses. Do not use hydrosponges.
6. Cure after grouting by covering with Kraft or construction paper for 72 hours. Install sealant in vertical wall joints at interior corners.

K. Marble Threshold
1. Provide thresholds at wall or framed openings to other building areas not receiving tile.
2. Set one piece threshold in adhesive without voids, full width of door opening.
3. Point threshold base flush with adjoining tile floors.
4. Cope ends to fit door frame profile.

L. Control Joints and Other Sealant Usage
1. Install control joints where tile abuts retaining surfaces such as perimeter walls, curbs, columns, wall corners and directly over cold joints and control joints in structural surfaces conforming to architectural details.
2. Install control joint in floors at spacings as indicated in TCA Installation Handbook, unless noted otherwise.
3. Rake or cut control joints through setting bed to supporting slab or structure. Keep joints free of mortar.
4. Install in accordance with TCA Installation Handbook.
5. Fill joints with self-leveling polyurethane sealant and backing material specified in Section 07910.
6. Fill joints around toilet fixtures with white silicone sanitary sealant. Refer to Section 07910.

M. Expansion Joints:
1. Keep expansion joints free of mortar and grout.

2. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
3. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCA EJ171 Expansion Joint requirements.
4. Install sealant in expansion joints.
5. Provide sealant material at items penetrating tile work, unless otherwise indicated.
6. Provide sealants and related materials in accordance with cited ANSI and TCA requirements.

3.4 Adjusting

Sound tile after setting. Replace hollow sounding units.

3.5 Cleaning

A. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.

B. Sponge and wash tile diagonally across joints. Polish with clean dry cloth.

C. Remove grout haze following recommendation of mortar additive manufacturer. Do not use acids for cleaning.

D. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

3.6 Protection

A. Prohibit traffic from floor finish for 72 hours after installation.

B. Where temporary use of new floors is unavoidable, supply large flat boards or plywood panels for walkways over Kraft paper.

C. Protect work so that it will be without any evidence of damage or use at time of acceptance.

END OF SECTION

## 1.0 - GENERAL

1.1 Related Documents

Drawings and general conditions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

1.2 Summary

A. Section Includes:

1. Acoustical ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:

1. Section 09260 - Gypsum Board
2. Section 09910 - Painting
3. Division 15 Sections - Mechanical Work
4. Division 16 Sections - Electrical Work

C. Substitutions:

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) 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 which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.
*See Section 01360 – Product Substitution for submittal process information and Product Substitution Form.*

1.3 References

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
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 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

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 6 inch x 6 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 which are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

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

2. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
   a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

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 acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 Project Conditions

A. Space Enclosure:

All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to and after installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions within the space or with interfacing construction such as walls or soffits. Abnormal conditions include exposure to chemical fumes, vibrations, moisture, excessive humidity, or excessive dirt or dust buildup.

HumiGuard Plus Ceilings: Installation of the products shall be carried out where the temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry. The ceilings must be maintained to avoid excessive dirt or dust buildup that would provide a medium for microbial growth on ceiling panels. Microbial protection does not extend beyond the treated surface as received from the factory, and does not protect other materials that contact the treated surface such as supported insulation materials.

1.8 Warranty

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturer's defects
3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Warranty Period Humiguard:

1. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max 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.

1.9 Maintenance

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

## 2.0 - PRODUCTS

2.1 Manufacturers

A. Ceiling Panels:
Armstrong World Industries, Inc. USG or pre-approved equal.

2.2 Acoustical Ceiling Units

A. Acoustical Panels Type L1 (with fire guard): Product:
Fine Fissured, 1831
1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude XL Fire Guard 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Acoustical Panels Type ML: Product: Clean Room VL, 868

1. Surface Texture: Smooth
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24in X 24in X 5/8in
5. Edge Profile: Square Lay-In for interface with Prelude Plus XL Fire Guard 15/16" Exposed Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
8. Emissions Testing: < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2007, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E 1264; Fire Resistive
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.80.
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

2.3 Suspension Systems (**WITH FIRE GUARD CEILING TILES ONLY)**

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C 635 HD.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude XL Fire Guard 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. 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.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

2.4 Suspension System for Use with Clean Room VL, 868

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized aluminum as per ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized aluminum in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C 635 HD.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude Plus XL Fire Guard 15/16" Exposed Tee as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. 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.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.

## 3.0 - EXECUTION

3.1 Examination of Adjoining Work

Do not proceed with installation until all wet work or work that has become wet such as concrete, CMU, terrazzo, plastering and painting has been completed and thoroughly dried out.

3.2 Preparation

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. 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 the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

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. Main beams are to be supported with hanger wires within 8" of vertical surface terminations.

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

D. Vertical Wall or soffit surfaces intended to be paint finished shall receive the first coat of primer or block fill prior to installation of wall moulding.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. 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.

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.

C. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.

D. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

## 1.0 - 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.

B. The Construction Waste Management plan prepared by the Construction Manager for coordination of waste material recycling is hereby incorporated by the reference as requirement of this section. Work under this section shall conform to the provisions outlined in the Plan and shall conform with the local recycling Standards to provide a coordinated effort to maximize reuse of waste materials.

1.2 Submittals

A. Submit for the approval of the Architect samples of each color and type of material. Mark each sample with the manufacturer's name, type material, pattern, color, catalog number, thickness, name of contractor, and name of project.

1.3 Delivery and Storage

A. Deliver materials to site in manufacturer's original, unopened containers clearly marked with manufacturer's brand name, color, and pattern numbers, and production run color code. Care shall be taken to prevent damage and freezing during delivery, handling, and storage.

B. Store materials at site for at least 24 hours before installation.

C. Maintain temperature of spaces where materials are stored and are to be installed at not less than 60° for at least 24 hours before installation. Thereafter, maintain a minimum temperature of 60°F.

## 2.0 - PRODUCTS

2.1 General

A. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.

B. Colors shall be uniform throughout.

C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer's color code.

D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows. Tests shall be performed by an independent testing laboratory.

| | | |
|---|---|---|
| Walls and Ceilings | Flame Spread | 25 or less ASTM E-84. |
| | Smoke Production | 350 or less ASTM E-84. |
| Floors | Flame Spread | 75 or less ASTM E-84. |
| | Smoke Production | 350 or less ASTM E-84. |

2.2 Manufacturers

A. Rubber Base Manufacturers
   1. Tarkett (Basis of Design)
   2. Roppe

3. Flexco
4. Mannington

B. Transition Material Manufacturers:
1. Tarkett
2. Roppe
3. Flexco
4. Mannington

C. Requests for substitution shall be considered in accordance with provision of Section 01360 and received by Architect at least 10 days prior to bid.

2.3 Wall Base Materials

A. Rubber Base shall be 4" high x running length. Rubber base shall be Johnsonite, Roppe or approved equal. Base type and color as specified on Finish Legend.

B. Provide 1/8" ga., 4 " high Tarkett/Johnsonite Baseworks Thermoset Rubber wall base standard profile conforming to ASTM F1861.
1. Color to be selected by Architect from manufacturer's full range of colors.
2. Refer to manufacturer's written installation instructions for complete installation details.

C. Refer to Section 09560 for Flexco Base Specialty.

D. Adhesives, including primer, shall be as manufactured or recommended by the manufacturer of the materials used.

E. Outside corners are to be mitered. V-cut back of base strip to two thirds of its thickness and fold. Use Tool # 532 cove base groover gunlach or equal. Inside corners are to be mitered.

**4' lengths or less and pre-mitered corners are not acceptable**

F. Provide caulk to fill in at bullnose corners.

2.4 Floor Transition Materials

A. Provide transition strips tapered to meet abutting materials on drawings.

2.5 Adhesives:

A. Wall Base Adhesives shall be as manufactured or recommended by the manufacturer of the materials used. Provide epoxy at "wet areas".
1. Wall Base Adhesives
a. Tarkett/Johnsonite 960 Wall Base Adhesive for porous surfaces
b. Tarkett/Johnsonite 946 Premium Contact Adhesive for non-porous surfaces
c. Tarkett/Johnsonite 965 Flooring and Tread Adhesive
d. Tarkett/Johnsonite 996 Two-Part Epoxy Adhesive
e. Tarkett/Johnsonite 975 Two-Part Urethane Adhesive
2. Caulk: Color Rite Inc.

B. Floor Transitions: Adhesives shall be as manufactured or recommended by the manufacturer of the materials used.

3.0 - EXECUTION

3.1 Inspection

Surfaces to receive rubber base shall meet the minimum requirements established by the rubber base manufacturer. Examine surfaces and correct defects before starting applications.

3.2 Precautions During Installations

A. Spaces in which rubber base material is being set shall be closed to traffic and to other work until the base is firmly set.

B. Where solvent-based adhesive is used, safety sparkproof fans shall be provided and operated when natural ventilation is inadequate. Smoking shall be prohibited.

3.3 Installation

A. Install rubber base materials only after all finishing operations have been completed. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by rubber base manufacturer.

B. Mix and apply adhesive in accordance with the manufacturer's instructions. Cover the area evenly and only to the extent which can be covered with rubber base material in the recommended working time of the adhesive.

C. Base shall be applied in such a manner that the entire under- surface shall be securely bonded in place. Base shall be laid tightly so that each piece is in contact with the adjoining pieces and all joints are in true alignment.

D. Apply resilient base to permanent walls, cabinets, and fixtures in rooms or areas as specified. Install base in as long lengths as practicable. Press down so that bottom cove edge follows floor. Scribe accurately to abutting materials.

3.4 Adjustments

Inspect and make necessary adjustments after heat is applied continuously in finished areas. Any portion of the rubber base which has not seated in a level plane with surrounding base and all damaged, imperfect, or improperly installed base shall be warmed, carefully removed, and new base of the same color and thickness substituted.

3.5 Cleaning and Waxing

Remove stains from base and clean as required and recommended by manufacturer.

3.6 Surplus Materials

Unused runs and one full carton of materials shall be left at the job and turned over to the Owners.

END OF SECTION

## 1.0 – GENERAL

### 1.1 Scope

A. The work under this section consists of all painting, finishing work and related items.

B. Paint or Painting shall include sealers, primers, stains, and oil, alkyd, latex and enamel paints and the application of these materials on surfaces prepared to produce a complete job whether or not every item is specifically mentioned. Where items are not mentioned they shall be furnished as specified for similar work. **Only work specifically noted as being excluded shall be left unfinished.**

C. This specification includes field painting of all exposed piping, metal, ductwork, conduit, hangers, mechanical and electrical equipment in finished spaces. A finished space is one listed in the Finish Schedule as having finish materials on walls and/or ceiling.

### 1.2 List of Proposed Materials

A. The contractor shall either verify in writing that he intends to apply the products listed in the Paint Schedule, or shall submit for approval a list of comparable materials of another listed approved manufacturer. This submittal shall include full identifying product names and catalog numbers.

### 1.3 Submittals

A. As soon as practicable after contract is let, submit for approval a detailed schedule of the paint proposed, listing the name of each product, and the surface to which it will be applied. Omission of any item from the approved schedule shall not relieve Contractor of his obligation.

B. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer / supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product / color / finish was used, product data pages, Material Safety Data Sheet (MSDS), care and cleaning instructions, Touch-up procedures.

### 1.4 Storage of Materials

A. Deliver all painting materials to job site at least three (3) days before beginning painting in original unbroken containers showing manufacturers name and type of paint, subject to Architect's inspection and approval.

B. All materials used on the job shall be stored in a single place. Such storage place shall be kept neat and clean, and all damage thereto or its surroundings shall be made good. Any soiled or used rags, waste, and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire.

1.5 Protection of Other Work

A. The painting contractor shall furnish and lay drop cloths in all areas where painting is being done to protect floors and other work from damage. He shall be responsible for any damage to other work and shall replace any materials which have been damaged to such an extent that they cannot be restored to their original condition. All damage must be repaired to the satisfaction of the Architect.

1.6 Job, Weather, and Temperature Conditions

A. Maintain temperature in building at constant 65° F. or above and provide adequate ventilation for escape of moisture from the building in order to prevent condensation mildew, damage to other work, and improper drying.

B. Exterior painting shall not be done when the temperature is below 50° F., while the surface is damp, or during cold, rainy, or frosty weather, or when the temperature is likely to drop to freezing within 24 hours. Avoid painting surfaces while they are exposed to hot sun.

C. Before painting is started in any area, the area shall be broom cleaned and excessive dust shall be removed from all areas to be painted. After painting operations begin in a given area, clean only with commercial vacuum cleaning equipment.

D. Adequate illumination shall be provided in all areas where painting operations are in progress.

1.7 Inspection of Surfaces

A. Before starting any work, surfaces to receive paint finishes shall be examined carefully for defects which cannot be corrected by the procedures specified under paint manufacturers recommended "Preparation of Surfaces" and which might prevent satisfactory painting results. Work shall not proceed until such damages are correct.

B. At areas of existing previously painted surface, the painting contractor shall field verify to assure compatibility between existing paint / coating material and the proposed new paint / coating material prior to procuring such new materials or products. Should a material or product compatibility conflict be discovered, the Contractor shall immediately notify the Architect for direction prior to proceeding with procuring such materials or products.

C. The beginning of work in a specific area shall be construed as acceptance of the surfaces and the Contractor shall be fully responsible for satisfactory work.

1.8 Quality Assurance

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats. An inspection is required by manufacture in between prime coat and finish. Per the request of the Architect.

C. Coordination of Work: Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings systems for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

D. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1.9 Cooperation With Other Trades

A. This work shall be scheduled and coordinated with other trades and shall not proceed until other work and/or job conditions are as required to produce satisfactory results.

B. The contractor shall examine the specifications for the various trades and shall thoroughly familiarize himself with all provisions regarding painting. **All surfaces that are left unfinished by the requirements of other sections shall be painted or finished as part of the work covered by this section.**

1.10 Maintenance Material

The contractor shall turn over to the Owner at the final inspection one gallon of each type and final color of the paint used on the project.

## 2.0 – PRODUCTS

2.1 Materials

A. Except where otherwise specifically stated hereinafter, painting materials shall be products of one of the following manufacturers without substitution of "Equal", and shall be in that manufacturer's top grade of the respective type: Benjamin Moore, PPG, or Sherwin-Williams (Basis of Design). The term "top grade" refers to the manufacturers advertised line of best quality and not to "Professional" or "maintenance" lines. Any deviations from the requirements of this article shall only be by written change order with contract price adjusted accordingly.

B. If job-mixed paints are used, submit proposed formulas for approval before proceeding with work. Thinning and tinting materials shall be as recommended by the manufacturer of the material used.

C. Paints and finishing materials shall be free from skins, lumps, or any foreign matter when used, and pigments, fillers, etc., shall be kept well stirred while being applied.

D. Interior finish materials shall comply with flame spread limitations and smoke production limitations as follows:

Walls and Ceilings - Flame Spread - 25 or less ASTM E-84.
Smoke Production - 350 or less ASTM E-84.

2.2 Colors

A. Not limited to "stock" ready-mixed colors. Bring to directed shades or tones by mixing.

B. In two-coat or three-coat work use slightly different colors for different coats to avoid skipping.

C. Accent or feature areas when indicated shall be colors as selected. Color spacing and pattern shall be as indicated and/or directed. Maximum three (3) colors per area.

D. Complete color scheme shall be as indicated on Finish Legend and Schedule.

2.3 Accessory Materials

Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, dusters, cleaning solvents, and waste as required to perform the work and achieve the results specified herein.

3.0 – EXECUTION

3.1 Workmanship

A. Surfaces shall be clean, dry, and free of oil, grease, dirt, mildew, loose or peeling paint, loose wood particles, and in proper condition for painting. All work shall be carefully done by skilled mechanics. Finished surfaces shall be uniform in coverage, gloss, finish and color, and free from brush marks. All coats shall be thoroughly dry before applying succeeding coats.

B. Do all work in strict accordance with manufacturer's label directions.

C. Hand sand woodwork until smooth and free from raised grain and other surface imperfections. First coat shall be applied before erection, to all surfaces, front and back. After woodwork is primed, fill nail holes, cracks, etc., full and smooth with putty. Lightly sand between coats where necessary in accord with good practice. Fully finish the top and bottom edges of doors and other woodwork edges not normally visible. Shellac knots and pitch streaks before painting.

D. On concrete or masonry, do no painting until the surface has dried to the equivalent of eight days drying time under well ventilated conditions in good drying weather.

E. Vertical surfaces to Interface with suspended acoustical panel ceiling shall be primed/filled to a minimum of 8" about finish ceiling elevation prior to the installation of the acoustical panel ceiling perimeter wall edge molding/trim.

F. Wash metal surfaces with mineral spirits to remove any dirt, grease, before applying materials. Where rust or scale is present, use wire brush, or sandpaper clean before painting. Clean shop coats of paint that become marred and touch up with specified primer.

G. Treat galvanized metal surfaces chemically with compound designed for this purpose, apply as per manufacturer's directions before applying first paint coat.

H. Remove and protect hardware panels, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Upon

completion of each space, carefully replace all removed items.

I. Exterior doors shall have tops, bottoms, and side edges finished the same as the exterior faces of these doors. Interior door shall have vision windows, louvers, grilles, etc. Finished to match door frame.

J. All closets and the interior of all cabinets shall be finished the same as adjoining room paint or stain unless otherwise scheduled. All other surfaces shall be finished the same as nearest or adjoining surfaces unless otherwise scheduled or directed.

3.2 Schedule

A. Exterior Metals

1. Galvanized metal shall be solvent clean with VM&P Naphtha.
Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
B66-600 Series

2. Non-primed metal shall be cleaned and etched with approved acid and washed with water.
Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating

3. Primed metals shall be inspected, scuffs, and abrasions sanded free of rust and receive full coat of primer. Concealed metal surfaces shall be spot primed.

Primer: S-W: Procryl B66 - 1310
Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating

B. Interior Metals

1. Non-primed metal shall be primed under this section.
Primer: S-W: Procryl B66 - 1310

Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating, Gloss

2. Primed metal shall have scratches and abrasions sanded free of rust and receive one full coat of primer.
Primer: S-W: Procryl B66 - 1310

Finish: Apply two coats
S-W: Pro Industrial DTM Acrylic Coating.

C. Exterior Exposed Concrete and/or Clay Brick Masonry
Primer: Loxon Exterior / Interior Concrete & Masonry Primer / Sealer, A24W8300
Block Filler:S-W: Pro Industrial Heavy Duty Acrylic Block filler, B42-151
Finish:
S-W: A-100 Exterior Latex

Sheen indicated on Finish Schedule

D. Interior Concrete and Concrete Masonry

1. Concrete Masonry Surfaces shall be filled unless noted otherwise.
   Prime: Pro Industrial Heavy Duty Acrylic Block Filler, B42W151
   Finish Apply Two Coats:
   S-W: Pro Industrial Pre-Catalyzed Waterbased Epoxy

   **Provide at all wet areas**
   S-W: Pro Industrial Waterbased Catalyzed Epoxy

   a. Note: Block Filler should achieve a smooth pinhole free appearance.
   b. This is necessary for proper protection before top coat is applied.
   c. Apply at recommended film thickness and spread rate as indicated by manufacturer.
   d. Architect requires manufacturer' inspection between block filler and top coat.

2. Concrete (Cast in Place or Precast)
   Primer: Loxon Exterior / Interior Concrete & Masonry Primer / Sealer A24W8300
   Finish Apply Two Coats:
   S-W: Pro Industrial Pre-Catalyzed Waterbased Epoxy

3. **Concrete Sealer:** Concrete MUST be etched, with H&C® Concrete Etcher or muriatic acid, following label directions.

   Reducer/Cleaner --- Aromatic 100, R2K5, or R7K65
   Brush – Use natural bristle brushes
   Roller – Use a ¼" – 3/8" nap woven or other solvent-resistant cover
   Freshly stained or painted surfaces will require cure time before any application of this H&C® High Performance Industrial Clear. Follow manufacturer's instructions and recommendations.

E. Interior Wood Doors and Natural Finish Wood

One (1) coat - Stain, of selected color, S-W: Wood Classics "250" Interior Wood Stain, A49-800
Or One (1) coat – S-W: Wood Classics Waterborne Polyurethane

F. Stenciled Wall Identification

Provide one coat red color stencil identification on walls above ceilings of corridor, Smokestop, Horizontal Exit, enclosures and Firewalls. Wording shall be:

1. Wording for fire walls shall indicate the rating and:
   Fire Barrier - Protect All Openings
   Both sides of wall are to be stenciled above the ceiling with one stencil sign to be placed above ceilings on all separate areas and maximum of 20'-0 o.c.
2. Wording for smoke barriers:
   Smoke Barrier - Protect All Openings
   Both sides of wall are to be stenciled above the ceiling with one stencil sign to be placed above ceilings on all separate areas and maximum of 20'-0 o.c.

G. Exterior Ground Mount and Roof Top Mechanical Units, Equipment and Accessories. Painting contractor shall examine the site and all drawings and provide one (1) heavy coat of paint for each unit. Provide also one (1) coat primer for galvanized and/or rust areas.

3.3 Material Application

A. All materials shall be applied in complete accordance with manufacturer's printed instructions.

B. All coats shall be thoroughly dry before the succeeding coat is applied.

END OF SECTION

## 1.0 - GENERAL

### 1.1 Scope
The work under this section consists of all markerboards and tack boards.

### 1.2 Submittals
Submit for approval completely detailed shop drawings including dimensions, construction details, materials, finish, and details of adjacent construction.

### 1.3 Manufacturer
The specifications and drawings are based on products of Claridge Products and Equipment Company to illustrate the standard of quality. Equivalent products by American Visual Display Products, LLC and PolyVision will be acceptable.

### 1.4 Guarantee
The Markerboards and Tack boards Contractor shall guarantee all materials and workmanship covered by this section for a period of one (1) year from date of final acceptance of the Contract, or from occupancy of the building, whichever is earlier.

## 2.0 - PRODUCTS

### 2.1 Markerboards

A. Markerboards shall be Claridge LCS 24-gauge Porcelain Enamel steel skin with 3/8" particle board core and .015" thick aluminum sheet backing, typical 4'-0" high x 12'-0" long. (other sizes as indicated). Color to be #32 LCS White. ("MB" as designated on plans.) Nontypical sizes shall be indicated.

B. Custom Lined Markerboards shall be Claridge LCS 24-gauge Porcelain Enamel steel skin with 3/8" particle board core and .015" thick aluminum sheet backing, typical 4'-0" high x 12'-0" long. (other sizes as indicated). Color to be #32 LCS White. ("LMB" as designated on plans.) Standard ruling for music lines, treble and bass clef notes. Non-typical sizes noted on plans.

### 2.2 Sliding Markerboards

A. Horizontal Sliding Chalkboard/Markerboard Units
   1. Series: (Architect to specify from manufacturer's standard units - two-track; three-track; four- track; or component parts.)
      a. Sliding Panels and/or Back Panel - Writing surface:
         1. Porcelain enamel steel Markerboard
   2. Sizes: (Specify panel length and height.) Standard height is 4 feet; standard length, up to 24 feet.
   3. Typical Arrangements: (Specify type and color of back panel, if required, and number, type, and color of sliding panels. Select from manufacturer's standards.)
   4. Component Parts: (Specify top mounted panels without housing or bottom mounted panels without housing.)

B. Metal Trim and Accessories: Provide aluminum extrusions as manufactured by Claridge Products and Equipment, Inc. Frame and exposed members shall be heavy gauge extruded aluminum and shall meet or exceed ASTM B221 Alloy

Standards.

1. Finish: Etched and anodized satin finish.
   a. Optional Finishes: Color Anodize or Powder Coat finishes available

2. Chalk trough: Standard continuous, solid type aluminum accessory tray with ribbed section and injection molded end closures.

C. Colors: As selected from manufacturer's standard colors.

D. Adhesive: As recommended by manufacturer.

2.3 Tack board

A. Tack board shall be Claridge Fabricork Vinyl, 1/2" two-ply with 1/4" cork and 1/4" backing, 4'-0" high x 4'0" wide. Colors as selected. ("TB") as designated on drawings)

B. Roll Fabricork #1500 with fabric covered moldings shall be used where wall panel tack boards are indicated. Fabric shall be Maharam Parallel 91180 or pre-approved equal.

2.4 Trim

A. Provide concealed mounting for Factory Built Units with Series #3, 1-1/4" trim as indicated, using a hollow marker tray at markerboard only. Provide premoulded end covers at all markertrays.

B. Provide full length map rail No. 74 with cork insert at top of markerboard with end stops. Provide 76M display hooks, 76-R.B. roller brackets, and 76-F.H. flag holders for each section.

C. Standard end and mullion trim between marker and tack boards.

D. All trim to be extruded aluminum with satin anodized finish.

2.5 Map and Display Rail

A. Rail shall be No. 74 extruded aluminum with 1/4" thick cork insert, 1" wide, length required by drawings.

B. Provide 74ES end caps for each section, No. 76M metal display hooks (24" o.c.).

## 3.0 - EXECUTION

3.1 Installation

A. Installation shall be mechanically anchored in accordance with the manufacturer's recommendations. All joints flush and neatly joined. No Glue shall be used.

B. Wash markerboards with water and detergent cleaner.

C. Contractor shall affix manufacturer's instructions to each Marker/Tack board unit which includes complete instructions on proper BREAKING IN of the markerboard.

D. Mounting heights shall be verified by the Owner prior to installation.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work required under this section consists of room & wall signage.

1.2 Existing Conditions

A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.

1.3 Submittals

A. Submit a sample of signs, including size, lettering style, materials, and finish.

B. Provide mounting templates.

C. Signs shall conform to requirements as set forth by the AMERICANS WITH DISABILITIES ACT Accessibility Guidelines.

D. Submit the schedule indicating each room name and number indicated on Architectural Drawings with a corresponding space for the Owner's markup for the actual room name and number per school system of each room name and number along with sign type to the Architect for review.

## 2.0 – PRODUCTS

2.1 Manufacturers

Subject to compliance requirements. Provide products by the following.

1. Leeds Architectural Letters, Inc. (Basis Of Design)
2. Devaney Sign Service, LLC
3. Bellco Sign & Engraving Specialists

2.2 Room and Wall Signs Standards

A. Provide photopolymer signs with Grade II Braille 3/4" numerals and 5/8" Letters to comply with ADA (American Disability Act). Signs shall be color selected from the manufacturer's full line of colors.

B. Room signs with message insert to have 1/16" front plate, minimum 1/32" solid spacer (no tape spacer), and 1/8" back plate.

C. Room Signs (no message slot)- minimum 1/8" thick with 1/32" raised letters.

D. Elevator and Stair Signs to be 6 x 6 and 1/8" thick with 1/32" raised letters.

E. Exterior Signs - Exterior Aluminum .040 thick, factory painted, and text to be silkscreened or inkjet print.

F. Edge Condition - Square Cut.

G. Corners - Round.

H. Mounting:
1. Sheet Rock – double-sided tape
2. Block or Brick – double-sided tape and silicone
3. Signs to be mounted with screws and anchors if specified.
4. Signs mounted on the wall adjacent to the latch side of the door 60" from floor to centerline of signs and 2" from the edge of the door frame to edge of the sign.

2.3 Typical Signage Schedule (refer to Architectural Signage Plan in construction documents)

A. All Offices, Classrooms, and Instructional Areas shall be 6" x 8" with a 2-1/2" x 8" changeable clear message insert unless otherwise indicated. **Refer to Item 1.2, Item A for existing signage conditions**

B. All other interior door signs except corridor and vestibule doors shall be a 6" x 6" with no message strip.

C. All restrooms shall have a minimum 6" x 8" sign with pictogram area with an additional area for raised copy and Braille.

D. 6" x 6" signs at all elevators on all floors. (Use Stairs in Case of Fire...etc.) if applicable.

E. 6" x 6" Stair Sign at every stair on all floors with pictogram if applicable.

F. 3" x 7" area of refuge sign with raised copy and Braille as indicated on the Life Safety Plans

G. Provide Framed Signage with Clear View Window. Frame to Match Interior Signage Cover) to accommodate an 8.5 x 11 Landscape Floor Plan. Provide two (2) per Classroom and Assembly Area.

H. 6" x 6" tactile exit sign at all interior exit doors leading directly to the exterior with raised copy and Braille. (Identified as **EXIT** on signage plan)

J. Occupant Load Sign to be provided at every Auditorium, Gymnasium, and Cafeteria (**Assembly Areas**) as required by IBC Section 1004.3

K. Storm Shelter Signage (**See Life Safety Plan if applicable**)

1. Provide the following Storm Shelter Signage as required by ICC 500-2014 and as indicated on the storm shelter plan located within architectural drawings.
a. Provide a 12" x 16" storm shelter plaque which shall be located within each storm shelter, as indicated.
b. Provide 8" x 8" storm shelter sign, location as indicated.
c. Provide 4" x 7" storm shelter instruction signs on each face of all storm doors as indicated.
d. Provide an 8"x8" sign adjacent to all doors leading to electrical equipment rooms containing stationary battery systems indicating "APPLY NO WATER," along with the type of battery system and current maintenance contact information

2.4 Pictorial Signs

A. Provide 12" x 18" baked enamel on metal sign with International Symbol for Accessibility Wheelchair and lettering "Physically Handicapped Parking Only." Each sign shall have a "Van Accessible" sign mounted to the post.

B. Provide Traffic Control signs as indicated on drawings and in accordance with the State of Alabama Highway Department Manual on Uniform Traffic Control Devices.

2.5 Project Sign - Specification requirements are listed in Section 01030.

3.0 - EXECUTION

3.1 Installation of Signs
Install signs on surfaces and at heights as directed.

3.2 Install "Physically Handicapped Parking Only" sign at Handicapped Parking Spaces as indicated.

3.3 Install Traffic Control Signs in accordance with State of Alabama Highway Department Manual on Uniform Traffic Control Devices.

**END OF SECTION**

## 1.0 -GENERAL

### 1.1 Scope

The work required under this section consists of custom engraved Information Plaque(s) to indicate pertinent roofing or re-roofing information on the actual roof site for the Owner's future use.

### 1.2 Submittals

Submit a full scale graphic representation of the proposed Information Plaque(s) for the Architect's approval.

### 1.3 Related Sections

A. Division One

B. TPO Roofing System, Section 07420, Asphalt Shingles Section 07310

## 2.0 - PRODUCTS

### 2.1 Information Plaque

A. Provide one Information Plaque at each distinguishable area of new roofing being provided under this contract as follows:
   1. Size: 3 ½" x 7" (min.)
   2. Material: 1/8" thick aluminum
   3. Finish: Match roof edge metal
   4. Text: Deep Engraved and painted to contrast
   5. Font: ¼" (min.) Romans
   6. Minimum Information:
      a. Date - Substantial Completion / Start of Warranty
      b. Owner / Architect
      c. General Contractor
      d. Roofing Sub-Contractor
      e. Roof System Manufacturer
      f. Description of roofing system / type
      g. Warranty period / information

## 3.0 - EXECUTION

### 3.1 Mounting

A. Provide Information Plaque with 3/32" mounting holes at opposite ends.

B. Permanently attach to building features so as not to cause leaks at each distinguishable field area of new roof work. Preferably at the north or northeast perimeter edge; otherwise consult the Architect.

C. Locate to be visible from atop the roof only and close to new work so as to not mistake the area being identified; 8" minimum above the finish roof surface.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope
The work under this section consists of all toilet accessories.

1.2 Samples
Returnable samples to be furnished upon request.

1.3 Manufacturer
Catalog numbers indicated in the schedule are from Bobrick Company catalog unless indicated otherwise. Equivalent products as manufactured by American Specialties, Inc., or Bradley, will be acceptable.

## 2.0 - PRODUCTS

2.1 List of Fixtures

A. The following list of accessories is essentially complete; however, the contractor shall examine the drawings carefully and shall supply such items not specifically called for to provide a complete installation.

B. Fixtures shall be supplied as follows:

1. Feminine Napkin Disposal - Model B-270, surface mounted, stainless steel finish. One per toilet compartment. (Female Only. Mount on opposite wall of toilet paper dispenser.) Provide at all Unisex Toilet locations.

2. Framed Mirror - Model B-165-1830, surface mounted, stainless steel finish. One per lavatory where noted. Custom mirrors are specified under Section 08810 - Glass and Glazing.

3. Grab Bars - Model B6806 (or 6861 at Shower Stall as indicated), 1-1/2" diameter, surface mounted with B-2571 anchors at masonry walls, stainless steel finish. Provide per ADA requirements at Handicapped Toilet Compartment and Shower Stall.

4. Coat hook with bumper - Model B-212, surface mount aluminum casting with satin finish to match stainless steel. Bumper is hard rubber secured with drive screw. Note: provide one (1) in toilet rooms without stalls.

2.2 Finishes

A. All fixtures specified or cataloged to be stainless steel shall be type 302 (18-8) with satin finish.

B. All fixtures specified or cataloged to be chrome finish shall be triple plated with heavy chrome over nickel and copper.

C. Mirrors shall be 1/4" electro-copper backed plate glass.

## 3.0 - EXECUTION

3.1 Attachment

A. All fixtures shall be secured to walls or partitions in the most secure method possible. Fixtures mounted singly against concrete block shall be secured with toggle bolts.

B. The proper mounting accessories shall be furnished with each item.

C. Contractor shall verify with Architect, the mounting locations and heights before installing accessories.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope

The work under this section consists of First Aid Kit and accessories as indicated to provide for a storm shelter facility.

First Aid Cabinets

Metal Cabinet with door and of sufficient size to handle contents and accessories for mounting. Clearly label cabinet.

1.2 Color shall be any of manufacturers standard as indicated or as selected by Architect. Paint to be high gloss finish.

1.3 Submittals

Submit for approval completely detailed shop drawings including dimensions, construction details, materials, finish and details of adjacent construction.

1.4 Manufacturer

The specifications and drawings are based on products of The American Red Cross to illustrate the standard of quality. Other Manufacturers may submit for pre-bid approval by the architect prior to bid in accordance with Specification Section 01360.

## 2.0 - PRODUCTS

2.1 Provide First Aid Kits for 100 Person Minimum ICC500 Approved

Contents to include but not be limited to:

Adhesive fabric bandages, 1" x 3"
Adhesive plastic bandages, 3/4" x 3"
Knuckle fabric bandages
Fingertip fabric bandages
Triangular sling/bandage, 40" x 40" x 56"
Gauze dressing pads, 3" x 3"
Conforming gauze roll, 2"
Conforming gauze roll, 3"
Trauma pad, 5" x 9"
Antiseptic cleansing wipes (sting free)
First aid burn cream pack, 0.9g each
First aid tape roll, 1/2" x 10" yds
Scissors,
Stainless steel tweezers,
Latex-free exam-quality vinyl gloves,
American Red Cross Emergency First Aid Guides

**Quantities shall be in accordance with ICC500 requirements**.

## 3.0 - EXECUTION

3.1 Installation

A. Installation shall be made in accordance with approved shop drawings and manufacturer's instructions.

B. Erect in a rigid substantial manner, straight, and plumb, with all horizontal lines level.

C. All evidence of drilling, cutting and fitting to room finish shall be concealed in the finish work.

3.2 Final Clean-up and Adjusting

A. Hardware shall be adjusted and left in good working order.

B. After all other work in the area, including painting, is complete, exposed surfaces, hardware, fittings and accessories shall be cleaned.

C. Any surfaces which have become damaged and cannot be touched up to match and give adequate protection will be rejected.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope
The work of this section consists of furnishing and installing complete, all miscellaneous furnishings and fixture items as indicated.

1.2 Submittals
Shop drawings shall be submitted.

1.3 Warranty
Provide Manufacturer's Standard Warranty where manufacturer warrants that the Goods delivered hereunder shall be of the kind described within this agreement and free from defects in material and workmanship under conditions of normal use for a period of six (6) years. Halotron, CO2 and Water/Water based extinguisher will be warrantied for a period of five (5) years.

## 2.0 - PRODUCTS

2.1 Fire Extinguisher Cabinets (FEC)
Recessed or semi-recess U.L. approved baked enamel 18 gauge steel cabinet, 24" h. x 10-1/2" w. x 6" d. with 2-1/2" trim. Cabinet door to be baked enamel or epoxy coated with stencil lettering "Fire Extinguisher" equal to J. L. Industries-Panorama #1017 Identity Q horizontal, white w/red letters - type break glass w/cly. lock; Larsen's Mfg. Co.; Amerex Corporation; or approved equal.

Provide comparable fire rated fire extinguisher cabinets in fire rated walls as per rating indicated.

2.2 Fire Extinguisher (FE)

A. Cabinet Mounted - U.L. approved, 10 pound, tri-class dry chemical for Class A, B, & C fires. Equal to J. L. Industries - Cosmic 10E with hose; Larsen's Mfg. Co.; Amerex Corporation. Provide one with each cabinet.

B. Wall Mounted - 10 pound, Tri-Class Dry Chemical for Class A, B, C fires, U.L. approved, Model 10 ABCS-1. Manufacturers: J.L. Industries, Larsens, Amerex Corporation.

C. Provide "K" type fire extinguishers at all kitchen locations.

## 3.0 - EXECUTION

3.1 Installation
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, ADA and approved details.

3.2 Fire Extinguishers shall be cabinet mounted in areas as indicated. Height shall be 4' from floor to extinguisher handles.

3.3 Fire Extinguishers shall be wall mounted in areas as indicated or required so that distance of travel between units does not exceed 75 feet. Each separate area shall have a minimum of one unit. Mounting height shall be 4' from floor to handle.

END OF SECTION

## 1.0 - GENERAL

1.1 Scope
The work of this section consists of furnishing and installing complete, all miscellaneous furnishings, fixtures, and signage items as indicated.

1.2 Existing Conditions
A. It is the general contractor's responsibility to field verify existing signage before a bid and provide signage that shall match all existing signage types and styles currently installed to provide a continuity of design to the owner as required.

1.3 Submittals
Shop drawings shall be submitted.

## 2.0 - PRODUCTS

2.1 Building Letters
Cast aluminum letters, equal to Leeds Architectural Letters, Inc., Select from all available fonts Size: As indicated on drawings, lay-out as indicated. Colors as selected by Architect. Provide flush concealed stud mounting.

2.2 Building Plaque
A. Dedication plaque shall be of cast aluminum. Furnish and install a 24" x 42" plaque with approximately 500 raised letters and raised border. Field shall have stipple finish. Face of letters and borders shall have ground satin finish surface.

B. Plaque layout and designation shall be furnished by the Architect.

2.3 Project Sign - Specification requirements are listed in Section 01030.

## 3.0 - EXECUTION

3.1 Installation
Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, and approved details.

3.2 Installation of Plaque(s)
Install plaque(s) where directed.

END OF SECTION

## 1.0 – GENERAL

1.1 Section Includes

A. Fixed modular laminate clad casework and components.

B. Countertops.

C. Mobile storage units, tables and components.

1.2 Related Sections

A. Blocking within walls where indicated: Division 6.

B. Millwork, trim, and custom cabinetry: Division 6 and 12.

C. Glass: Division 8.

D. Base molding: Division 9.

E. Sinks and service fixtures, service waste lines, connections, and vents: Division 15.

F. Electrical service fixtures: Division 16.

1.3 Quality Assurance

A. Manufacturer: Minimum of 5 years' experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.

B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.

C. All manufactured casework systems, countertops and related items herein specified shall be furnished by one contractor to insure single source responsibility, and integration with other building trades.

1.4 Submittals

A. Comply with Section 01350, unless otherwise indicated.

B. Product Data: Manufacturer's catalog with specifications and construction details.

C. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.

1. Include production drawings for all casework systems and section drawings of all casework, work surfaces and accessories.

2. Indicate locations of plumbing and electrical service field connection by others.

3. Include layout with units in relation to surrounding walls, doors, windows, and other building components.

4. Coordinate production drawings with other work involved.

D. Casework Samples:
1. Component samples: Two sets of samples for each of the following: Decorative laminate color charts / PVC and ABS edgings.

1.5 Product Handling

A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed, store in ventilated place, protected from the weather, with relative humidity range of 25 percent to 55 percent.

B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

C. General Contractor shall be responsible for protection of all casework and tops after installation is complete.

1.6 Job Conditions

A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.

2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.

B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete.
1. Flooring required to be placed under casework and equipment must be installed prior to installation.

2. Wood or metal blocking (wall grounds) shall be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.

3. Walls and openings shall be plumb, straight and square. Concrete floors shall be level within acceptable trade tolerances. Specifically the floor must be within 1/8" of level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.

4. All overhead mechanical, electrical or plumbing rough-in work shall be complete

5. Ceiling grids (with or without ceiling tiles), overhead soffits, duct work and lighting shall be installed.

6. Painting shall be complete.

7. General Contractor shall provide a secure storage area within the building that is clean, dry, well ventilated, protected from direct sunlight and broom clean.

1.7 Warranty

All materials and workmanship covered by this section will carry a five (5) year warranty from date of acceptance.

## 2.0 – PRODUCTS

2.1 Manufacturers:

A. Manufacturer:
Casework shall be Stevens, Advanced Cabinet Systems or pre-approved equal. Each manufacturer must be able to provide casework (including selected plastic laminate colors) as specified and detailed in drawings and specifications.

B. Substitutions:

1. Casework of other manufacturers will be considered for pre-approval, providing written request is received and approved at least ten (10) days prior to announced bid date and approved by Addendum. Bidder shall state in writing any deviations from requirements and specifications. The casework shall conform to the configuration, arrangement, design, material quality, joinery, panel thickness, and surfacing of that specified and shown on drawings.

2. Manufacturer must be Architectural Woodwork Institute (AWI) Premium Certified.

3. Requests for product substitutions must comply with Section 01360 – Product Substitution Procedures.

2.2 Materials

A. Core Materials:

1. Particleboard up to 7/8 inch thick: Industrial Grade average 47-pound density particleboard, ANSI A 208.1-1999, M-3.

2. Particleboard 1 inch thick and thicker: Industrial Grade average 45-pound density particle-board, ANSI A 208.1-1999, M-2.

3. Medium Density Fiberboard 1/4 inch thick: Average 54-pound density grade, ANSI A208.2.

4. MR Moisture Resistant Particleboard: Average 47-pound density particleboard, ANSI A208.1 1-1999, M-3.

B. Decorative Laminates: GREENGAURD Indoor Air Quality Certified

1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-2005.

2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-2005.

3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-2005.

4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-2005.

5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-2005.

6. Thermally fused melamine laminate, NEMA Test LD 3-2005, color to be selected by architect.

C. Laminate Color Selection: Nevamar, Wilson Art, Formica, Laminart, Arbonite, and Pionite are approved manufacturers. Manufacturer, colors, and pattern shall be selected from premium grade laminate and indicated on finish legend and schedule.

D. Edging Materials:
1. 1mm PVC banding, machine applied; match laminate as schedule
2. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius; match laminate as scheduled

E. Glass:
1. Wall unit full sliding glass doors: 1/4 inch thick laminated safety glass.

2. Glass insert doors, hinged or sliding wall cabinets: 1/4 inch thick laminated safety glass.

3. Glass insert doors, hinged or sliding tall or base cabinets. 1/4 inch thick laminate safety glass.

4. Sliding doors mounted in aluminum track.

5. Trim glass inserts: Extruded rigid PVC channel and self-locking insert retainer strip.

2.3 Specialty Items

A. Support Members:
1. Countertop support brackets: Epoxy powder coated, 11 gauge steel with integral cleat mount opening and wire management opening.

2. Undercounter support frames: Epoxy powder coated.

3. Legs: Epoxy powder coated.

4. Brackets must support minimum of 600 lbs. without use of cross brace.

2.4 Cabinet Hardware

A. Hinges:

1. 270 degree five knuckle - epoxy powder coated, institutional grade, 2-3/4 inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1..
   a. Doors 48 inches and over in height have 3 hinges per door.
   b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.
   c. Finish to be selected by Architect.
   d. location for installation shall be noted on schedules on the drawings.

B. Pulls:
One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life. Pull design shall comply with the Americans with Disability Act (ADA). Finish to be selected by Architect.
   a. Anodized aluminum wire pull, 8mm diameter with 96mm O.C. mounting holes

C. Drawer Slides:
1. Regular, knee space and pencil: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.

2. File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

D. Adjustable Shelf Supports:
1. Injection molded transparent polycarbonate friction fit into cabinet end panels and vertical dividers, adjustable on 32mm centers. Each shelf support has 2 integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The support automatically adapts to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.

E. Locks:
1. Removable core, disc tumbler, cam style lock with strike. Lock for sliding 3/4 inch thick doors is a disc type plunger lock, sliding door type with strike. Lock for sliding glass/acrylic doors is a ratchet type sliding showcase lock.

2. Keying:

Keying as indicated on drawings shall be:
1. Alike. Per Room and Master.
2. Provide 2 master keys to Owner.

3. Elbow catch or chain bolt used to secure inactive door on all locked cabinets.

F. Sliding Door Track: Anodized aluminum double channel.

G. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.

H. File Suspension System: Extruded molding integral with top of drawer box sides to accept standard hanging file folders.

I. Mirrors: 1/4 inch thick polished mirror plate.

2.5 Fabrication:
A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown. Tall Cabinets: All wardrobe cabinets are to be to be 29" deep unless noted otherwise on architectural drawings

B. All casework panel components must go through a supplemental sizing process after cutting, producing a panel precisely finished in size and squared to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.

C. Cabinet Body Construction:
1. All cabinet body construction shall be secured utilizing concealed interlocking mechanical fasteners. Construction must meet requirements in the AWS Manual, Edition 2, including errata through 2016 and appendix section.

a. Tops, bottoms and sides of all cabinets are particleboard core.

b. Tops, bottoms and sides of sink base units are moisture resistant particleboard core.

c. Sink Base Countertop substrate shall be 3/4" MR particleboard. Which shall run entire length of sink base unit. Joints or breaks at sink opening shall not be accepted. If necessary breaks shall only be allowed 4' to the right or left of the centerline of the drain.

2. Cabinet backs: Minimum 1/4 inch thick particle board core (maximum of 1/2 inch thick particle board)

   a. Exposed back on fixed: 3/4 inch thick particleboard with the exterior surface finished in VGS laminate as selected.

   b. Exposed back on fixed: 3/4 inch thick moisture resistant particleboard with the exterior surface finished in VGS laminate as selected.

3. Cabinet base and tall units shall have a site-built toe base, constructed of 3/4-inch (minimum) lumber unless otherwise shown on the drawings. Base is 96mm (nominal 4 inch) high unless otherwise indicated on the drawings.

4. Base units, except sink base units: Full sub-top. Sink base units are constructed of 3/4 inch moisture resistant particleboard and the base shelf shall be laminated both sides with cabinet liner.

5. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.

6. Exposed and semi exposed edges.
   Edging: 1mm PVC.

7. Adjustable shelf core: 3/4 inch thick particleboard up to 36 inches wide, 1 inch thick particleboard over 36 inches wide.
   Front edge: 1mm PVC.

8. Interior finish, units with open Interiors: (exposed areas)

   a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces that are exposed to receive thermally fused melamine to match exterior laminate.

   b. Laminate color to be selected by architect.

9. Interior finish, units with closed Interiors:

   a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine to match other laminate.

   b. Laminate color to be selected by architect.

10. Exposed ends:
    Faced with VGS high-pressure decorative laminate.

11. Wall unit bottom:
    Faced with thermally fused melamine laminate. (non-exposed areas only)

12. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.

13. All wardrobe cabinets are to be 29" deep unless noted otherwise on architectural drawings

D. Drawers:

1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 3mm PVC.

2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.

3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.

E. Door/Drawer Fronts:

1. Core: 3/4 inch thick moisture resistant particleboard at sink units.

2. Provide double doors in opening in excess of 24 inches wide.

3. Faces:

a. Exterior: VGS High-pressure decorative laminate.

b. Interior: High-pressure cabinet liner CLS.

c. All exposed areas to receive matching laminate color as face.

4. Door/drawer edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

F. Miscellaneous Shelving:

1. Core material: 3/4 inch or 1 inch thick particleboard.

2. Exterior: VGS High-pressure decorative laminate.

3. Edges: 3mm PVC (at open storage shelving on metal standards), external edges and outside corners machine profiled to 1/8 inch radius.

2.6 Decorative Laminate Countertops:

A. All laminate clad countertops shown on drawings for fixed casework shall be constructed with minimum 1-1/6"" solid particleboard, except at sink and wet areas.
Furnish plywood core tops and splashes, two and a half feet each side of center line of all sinks. All tops shall be laminated on the top face with GP50 (.050) high pressure decorative laminate and shall also have BK20 backer sheet creating balanced construction. The plastic laminate tops required for the rail mounted casework shall be constructed the same as the fixed laminate

tops in the lengths indicated on the drawings. The rail mounted tops mounted over brackets shall be 1-1/4 inches from the wall to create a continuous grommet behind the back of the top. The rail mounted tops shall be supplied with 3mm PVC on all four edges. Provide tight joint fasteners where needed. All exposed edges, including edges of backsplash where used, shall have 3mm PVC banding, machine applied with waterproof hot melt adhesive. Exposed edges and corners shall be machine profiled to 1/8" radius for safety. Edging shall be available in colors as listed in Specification. Furnish 4" high backsplashes behind all sinks and as indicated on architectural drawings.

## 3.0 - EXECUTION

3.1 Inspection

The casework contractor must examine the job site and the conditions under which the work under this section is to be performed, and notify the building owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until satisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 Preparation

Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.3 Installation

A. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.

B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind.

C. Repair minor damage per plastic laminate manufacturer's recommendations.

3.4 Cleaning

A. Remove and dispose of all packing materials and related construction debris.

B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

3.5 Color Selection:

Laminate Color Selection: See Finish Legend and Schedule for color selections.

END OF SECTION

## 1.0 – General

### 1.1 Scope

A. Furnish and install 1" Mini Horizontal Aluminum Blinds (Premium Quality)

B. Related Work Specified Elsewhere:

1. Section 06100: Rough Carpentry
2. Section 08570: Aluminum Windows

### 1.2 References

A. Flame-Resistant Materials Shall Pass Or Exceed One Or More Of The Following Tests:

1. National Fire Protection Association (NFPA) 701 (small scale for horizontal applications)
2. Department of Transportation Motor Vehicle Safety Standard 302 Flammability of Interior Materials
3. California Administrative Code Title 19
4. Federal Standard 191 Method 5903

### 1.3 Submittals

A. Product Data: Manufacturer's descriptive literature shall be submitted indicating materials, finishes, construction and installation instructions and verifying that product meets requirements specified. Manufacturers' recommendations for maintenance and cleaning shall be included.

B. Drawings And Diagrams: Wiring diagrams of any motorized components or units, working and assembly drawings shall be supplied as requested.

C. Sample: Submit one sample shade of each type specified for approval. Supplied units shall be furnished complete with all required components, mounting and associated hardware, instructions and warranty.

### 1.4 Quality Assurance:

A. Supplier: Manufacturer, subsidiary or licensed agent shall be approved to supply the products specified, and to honor any claims against product presented in accordance with warranty.

B. Installer: Installer or agent shall be qualified to install specified products by prior experience, demonstrated performance and acceptance of requirements of manufacturer, subsidiary, or licensed agent. Installer shall be responsible for an acceptable installation.

C. Provide 1" Mini Horizontal Aluminum Blinds of only one manufacturer for entire project.

### 1.5 Delivery, Storage And Handling:

A. Product shall be delivered to site in manufacturer's original packaging.

B. Product shall be handled and stored to prevent damage to materials, finishes and operating mechanisms.

### 1.6 Job Conditions:

A. Prior to shade installation, building shall be enclosed.

B. Interior temperature shall be maintained between 60° F. and 90° F. during and after installation; relative humidity shall not exceed 80%. Wet work shall be complete and dry.

1.7 Warranty:
Lifetime Limited Warranty. Specific product warranties available from manufacturer or its authorized agent.

## 2.0 – PRODUCTS

2.1 Acceptable Manufacturer

A. Product: Hunter Douglas "CD60 1" Mini Aluminum Blind", or pre-approved equal.

B. Materials:

1. SLATS: 1" wide x .006" thick prior to painting, heat-treated and spring tempered (except 5000 series alloy on metallized finishes) aluminum alloy 6011 with eased corners and manufacturing burrs removed. Furnish not less than nominal 15.2 slats per foot to ensure tight closure and light control. Finish with manufacturer's standard baked-on finish in colors selected by architect from manufacturer's available contract colors utilizing Dust Shield™ finish to inhibit dust build-up for easier maintenance.

2. SLAT SUPPORT: Braided ladders of 100% polyester yarn color compatible with slats and spacing of ladder no more than 20mm.

3. HEADRAIL: U-shaped profile with rolled edges, measuring 1 3/8" x 1 3/8" x .024" constructed of corrosion resistant steel and providing a sleek beveled edge valance-free design. Internally fit with components required for specified performance and designed for smooth, quiet, trouble-free operation. Headrail finish to be standard baked-on polyester and to match slats. Ends fitted with .024" steel end lock with adjustable tab for centering blinds.

4. BOTTOM RAIL: Steel, with corrosion-resistant finish formed with double-lock seam into closed oval shape for optimum beam and torsional strength. Ends fitted with color-coordinated engineered polymer caps. Color-coordinated engineered polymer tape buttons secure the ladder and cord. Bottom Rail finish to be standard baked-on polyester color coordinated to slats.

5. LIFTING MECHANISM: Crash proof steel cordlocks with corrosion-resistant finish, two-ply polyester cord filler in braided polyester jacket lift cords, cord equalizers, cordlock adapter, and Break-Thru® safety tassel. Located on either side of individual blind unit as per architect's request.

6. TILTING MECHANISM: Permanently lubricated die-cast worm and gear type tilter gear mechanism in fully enclosed housing with clutch action to protect ladder tapes from over rotation of the solid steel, corrosion resistant tilt rod.

7. TILT CONTROL WAND: Tubular shaped 7/16" diameter extruded clear plastic, ribbed for positive grip and detachable without tools. Located on either side of individual blind unit as per architect's request.

8. MOUNTING HARDWARE: Manufacturer's standard .042" steel box brackets with baked-on polyester finish to match headrail with additional support brackets for blinds over 60" wide.

2.2 Fabrication

A. Blind measurements shall be accurate to within + 1/8" or as recommended in writing by manufacturer.

2.3 Finishes

A. Slat finish color to be selected by the Architect.

B. Slat Support braided ladders shall be color coordinated with slat.

3.0 - EXECUTION

3.1 Inspection:

A. Contractor shall be responsible for inspection on site, approval of mounting surfaces, installation conditions and field measurement for this work.

B. Other Interacting Trades shall receive drawings of shade systems, dimensions, assembly and installation methods from contractor upon request.

3.2 Installation:

A. Installation shall comply with manufacturer's specifications, standards and procedures as detailed on contract drawings.

B. Adequate Clearance shall be provided to permit unencumbered operation of shade and hardware.

C. Clean finish installation of dirt and finger marks. Leave work area clean and free of debris.

3.3 Demonstration:

A. Demonstrate operation method and instruct owner's personnel in the proper operation and maintenance of the blinds.

END OF SECTION

Margaret Elementary School Classroom Addition

**Pinnacle** Project #23198

Specification Index

## MECHANICAL

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS:

A. The "General Conditions", "Supplementary Conditions", Statutory Declarations, Special Conditions and Division 1 of the specifications as written and referred to are adopted and made part of Division 15.

### 1.2 SUBMITTALS:

A. Submittals shall include the documents listed below:

1. Certificates of Inspection and Approval.
2. Qualifications of Superintendent.
3. Warranties.
4. List of proposed material manufacturers.
5. Operating and Maintenance Manuals.
6. Record As-Built prints.
7. Record electronic As-Built drawings

### 1.3 DESCRIPTION OF WORK:

A. Provide equipment, labor, material, etc., required to make a complete working installation as shown or as specified.

B. Equipment and materials used in the work shall be:

1. In accordance with the contract documents.
2. The best quality and grade for the use intended.
3. New and unused.
4. The manufacturer's latest standard or current model.

C. All equipment and method shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations.

1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as

motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3. Contractor is responsible for dimensions and sizes of equipment. Inform Architect in writing of equipment differing from that shown.

D. Mechanical work includes, but is not limited to:

1. Make arrangements with local utility company for services as shown or specified.

2. Obtain all permits and inspections.

3. Complete alterations and additions to the domestic hot and cold water system. Provide sanitary rinse and flush.

4. Complete alterations and additions to the interior sanitary sewer.

5. Complete insulation on piping, ductwork and equipment.

6. Complete alterations and additions to refrigerant piping system.

7. Complete alterations and additions to the air cooled condensing units.

8. Complete alterations and additions to air handling systems and ventilating systems.

9. Complete alterations and additions to the ductwork.

10. Install devices furnished by the Temperature Controls sub-contractor.

11. Testing and Balancing will be by Independent Agency paid by this Contractor.

12. Provide vibration isolation devices for all rotating or reciprocating equipment and piping connected to that equipment.

13. Provide roofing including flashing, and counter flashing for roof mounted equipment, roof penetrations and supports for work in this Division, unless noted otherwise.

1.4 UTILITY CONNECTIONS:

A. Arrange with local utility companies for utility service connections, taps, meters and installation. Pay all fees and charges (if any) necessary for the utility services shown on the drawings or listed in the specifications.

B. It is the responsibility of the Contractor to re-confirm with the Utility Companies, prior to bidding, that locations, arrangements, line sizes, pressures, interruptions, shut downs, etc. are in accordance with their regulations and requirements.

C. If the utility company requirements are at variance with these drawings and specifications, this Contractor shall include the utility company requirements in his work without additional cost to the Owner.

D. Obtain from Utility Company any additional charges for service of type, size and location called for. Include charges in bid to be paid by Contractor to appropriate party. Provide payment of these charges so as to allow logical progression of construction and avoid delay

of completion.

E. Should cost above not be available prior to bid, submit with bid a letter signed by responsible Utility Company personnel stating that cost is not available. Prime Contractor shall submit letter with his bid to Owner. Cost will then be omitted from contract and become responsibility of Owner.

F. Furnish with shop drawings a signed document from each utility company describing location and type of service to be supplied and requirements for service. Document shall be signed by the appropriate responsible representative of the respective utility company.

1.5 WORK IN EXISTING BUILDINGS:

A. Existing mechanical (HVAC and plumbing) systems serving spaces involved in construction, or areas affected by construction, must be maintained and protected.

B. Contractor shall protect existing systems to keep them operational, or shall relocate the systems to keep them operational.

C. Temporary systems shall maintain the same level of capacity, protection, and safety provided by the permanent system being modified.

D. Coordinate routing of temporary systems and scheduling of interruptions with General Contractor , other trades, and Owner.

E. Disconnect and remove temporary systems when permanent systems are installed and running.

F. Contractor shall prepare drawings showing proposed methods of modifying existing systems (Work Around Plans) to maintain services to existing spaces during construction.

1.6 WORK NOT INCLUDED:

A. Finish painting of piping, ductwork or equipment.

B. Electrical wiring and conduits shown on the electrical drawings.

1.7 RELATED WORK SPECIFIED ELSEWHERE:

A. Electrical: Division 16.

1.8 REQUIREMENTS OF REGULATORY AGENCIES:

A. Obtain and pay for all permits required for the work. Comply with all ordinances pertaining to work described herein.

B. Install the work under this Division in accordance with drawings and specifications and the standards and codes (latest edition) that apply to this work. In the event of a conflict, install work in accordance with the most stringent code requirements determined by Architect.

C. Arrange, pay for and complete work to pass required tests by agencies having authority over work. Deliver to Architect Certificates of Inspection and approval issued by authorities.

1.9 QUALIFICATION OF CONTRACTOR:

A. Has completed minimum two projects same size and scope in past five (5) years.

B. This qualification applies to Sub-Contractors.

C. Use workmen experienced in their respective trade. Submit qualifications of Superintendent for review.

D. Owner reserves right to reject bid of any Contractor failing to meet these qualifications.

1.10 GENERAL JOB REQUIREMENTS:

A. Drawings and Specifications:

1. Work for the mechanical trades are shown on the drawings series M (HVAC) and P (Plumbing).

2. Drawings and specifications are complementary. Work called for by one is binding as if called for by both.

3. Drawings are drawn to a small scale and are diagrammatic only. The drawings indicate size and general arrangement of equipment.

4. Do not scale drawings for exact locations. Refer to architectural drawings. Field measurements take precedence.

B. Provide necessary offsets, elbows and fittings as required to avoid conflict with equipment of other Divisions and to obtain proper headroom and clear passageways. This shall be done at no additional cost to the Owner.

C. Visit to Site/Work in other Division:

1. Examine not only the plans and specifications for this Division, but plans and specifications of the other Divisions of work and visit the site to become acquainted with existing conditions. Execution of Contract is evidence that Contractor has examined all drawings and specifications, and that all conditions which have a bearing in any way on the manner of installing the work in this Division are known. Later claims for labor and materials required due to difficulties encountered, which could have been foreseen had examination been made, will not be recognized.

D. Underground Utilities/Concealed Utilities:

1. All utilities and services, whether shown on the drawings or not, shall be suitably protected and maintained, and any damages thereto shall be promptly repaired. Owner shall be advised immediately of any damages sustained. If any extra expense is incurred due to the existence of buried utilities not shown on the drawings, or the location of which is not made known to the Contractor, the contract price shall be adjusted in accordance with the General Conditions. The Contractor shall advise the Owner three (3) days in advance of any operation which could possibly disrupt any underground utility. The Contractor shall utilize locator services to mark any underground utilities in the area he is working in, and shall make any other measure deemed necessary to avoid utility disruption.

E. Definitions:

| | | |
|---|---|---|
| 1. | Concealed: | Materials or systems not visible. Work installed above a ceiling, furred behind a wall or enclosed in a chase. |
| 2. | Exposed: | Materials or systems that are visible. Work installed in a room without a ceiling. Work not enclosed by walls. |
| 3. | Provide: | Furnish, install and make complete. |
| 4. | Install: | Receive, unload, move into place, and make connections. |
| 5. | Work: | Materials completely installed and connected. |
| 6. | ADC: | Air Diffusion Council. |
| 7. | AGA: | American Gas Association. |
| 8. | AMCA : | Air Movement and Control Association. |
| 9. | ANSI: | American National Standard Institute. |
| 10. | API: | American Petroleum Institute. |
| 11. | ARI: | American Refrigeration Institute. |
| 12. | ASHRAE: | American Society of Heating, Refrigerating and Air Conditioning Engineers. |
| 13. | ASME: | American Society of Mechanical Engineers. |
| 14. | ASTM: | American Society of Testing Materials. |
| 15. | AWS : | American Welding Society. |
| 16. | FM: | Association of Factory Mutual Fire Insurance Company. |
| 17. | MSS: | Manufacturer's Standard Society of the Valve and Fittings Industry, Inc. |
| 18. | NEC: | National Electrical Code. |
| 19. | NEMA: | National Electrical Manufacturer's Association. |
| 20. | NFPA: | National Fire Protection Association. |
| 21. | NRCA : | National Roofing Contractors Association. |
| 22. | NSF: | National Sanitation Foundation. |
| 23. | OSHA: | Occupational Safety and Health Act. |
| 24. | PDI: | Plumbing Drainage Institute. |
| 25. | SMACNA: | Sheet Metal and Air Conditioning Contractors National Association. |

26. Standard: Building Code, Gas Code, Mechanical Code, Plumbing Code.

27. UL: Underwriters Laboratories.

F. Workmanship, Warranty and Acceptance:

1. Work under this Division shall be first class with emphasis on neatness and workmanship.

2. Install work using competent mechanics, under supervision of foreman, all duly certified by local authorities. Installation subject to Architect's or Engineer's observation, final approval, and acceptance. Architect or Engineer may reject unsuitable work.

3. Furnish Architect written warranty, stating that if workmanship and/or materials executed under this Division is proven defective within one (1) year after final acceptance, such defects and other work damaged will be repaired and/or replaced.

4. In event that project is occupied or system placed in operation in several phases at Owner's request, warranty will begin on date each system or item of equipment is accepted by Owner.

G. Observations of Work and Demonstration of Operation:

1. When observations are scheduled, provide sufficient personnel to expedite removal of access doors, coverplates, manholes covers, etc.

2. Contractor to assist Architect or Engineer in demonstration of operation of new systems to satisfaction of Owner. Contractor to have manpower available for demonstration of systems where requested by Owner.

H. Materials and Substitutions:

1. All materials shall be new. All materials and equipment for which a UL Standard, an AGA approval, an AWWA standard, FM listing or ASME requirements is established, shall be so approved and labeled or stamped.

2. Wherever in these specifications products are specified by manufacturer's name, bids shall be based on the named products. Where more than one manufacturer's name is mentioned, the one first listed establishes the standard for that product. If the bidder desires to submit a product of a manufacturer other that listed first, it must be the equivalent of the one listed first.

3. The drawings are based on the use of products specified and listed first. If any revision in piping, conduit work, foundations, anchor bolts, connections, etc., is required by other named products or approved substitutions, it shall be the Contractor's responsibility to make such revisions at no additional expense to the Owner.

4. If any bidder desires to submit products of manufacturers not listed, he may submit a request for prior approval to the Engineer no later than 10 days prior to the bid date. If the Engineer decides to accept the manufacturers, they will be listed as "Approved" by written addendum.

5. If the manufacturers are not listed as approved either by addendum or in the specifications, they will not be accepted.

6. Submit to Architect a complete list of proposed material manufacturers. List does not preclude submission of shop drawings. Approval of manufacturer or list does not constitute approval of specific material or equipment.

I. Operating and Maintenance Manuals:

1. Provide maintenance and operating manuals bound in 8-1/2" x 11" hardback, three-post binders. Manuals shall contain written instructions for each system, shop drawings, schematic drawings, equipment catalog cuts, manufacturer's instructions, manufacturers warranties, and valve tag list.

2. Arrange information in the following sequence: title of job, Owner, address, date of submittal, name of Contractor, name of Engineer, index, shop drawings, operating instruction, Contractor's purchase order numbers, supplier's name and address, date of start-up of each piece of equipment and valve tag list.

3. Submit one (1) copy for review. Make required corrections, and submit two (2) record copies.

J. Record As-Built Prints:

1. Provide Record As-Built prints at the completion of job. Keep set of prints on job and record day to day changes to Contract drawings with red pencil. Indicate actual location of piping, ductwork, valves, dampers, and equipment. Turn over prints to Architect at final observation.

2. Provide the following items for Owner at time of substantial completion:

a. Certificates of inspection and approval from authorities having jurisdiction.

b. Warranties.

c. Record As-Built prints.

d. Record As-Built plans in electronic (PDF) format.

e. Operating and Maintenance Manuals (3 copies).

f. Operating and maintenance manuals - PDF files on DVD disk.

g. Spare Parts (furnish receipt).

h. Affidavit of Owner Instruction (1 copy).

i. Release of Liens.

1.11 PROTECTION AND STORAGE:

A. Provide warning lights, bracing, shoring, rails, guards and covers necessary to prevent damage or injury.

B. Protect all equipment and materials, from damage by weather, entrance of water or dirt. Cap open piping, use plastic covers made for that purpose. Do not use rags or construction debris.

C. Avoid damage to materials and equipment in place. Repair, or remove and replace damaged work and materials.

D. Protect all surfaces from weld spatter, solder and cutting oil.

E. Deliver equipment and materials to job site in original, unopened, labeled container. Store to prevent damage and injury. Store ferrous materials to prevent rusting. Store finished materials and equipment to prevent staining and discoloring. Store materials affected by condensation in warm dry areas. Provide heaters. Storage space on site and in building designated by Owner/Architect.

END OF SECTION 15010

SECTION 15015 - MECHANICAL SUBMITTALS

## 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 procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

### 1.3 DEFINITIONS:

A. Action Submittals: Written and graphic information that requires Engineer's through the Architect responsive action.

### 1.4 SUBMITTAL PROCEDURES:

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer through the Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Concurrent Review: Where concurrent review of submittals by other consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.

a. Division 15 equipment requiring electrical connection
b. Fire protection plans

3. If intermediate submittal is necessary, process it in same manner as initial submittal.

4. Allow 15 days for processing each resubmittal.

5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.

3. Include the following information on label for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name and address of Contractor.
e. Name and address of Sub-Contractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Unique identifier, including revision number.
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

G. Number of Copies:

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.

2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package submittals into binders or booklets. Submit plumbing and HVAC into separate binders or booklets.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

3. 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. Submittal and transmittal distribution record.
i. Remarks.
j. Signature of transmitter.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 - PRODUCTS

2.1 SUBMITTALS:

A. General: Prepare and submit Submittals required by individual Specification Sections.

1. Number of Copies: Submit 6 copies of each submittal, unless otherwise indicated. Engineer through Architect will return 5 copies. Mark up and retain one returned copy as a Project Record Document.

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 operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

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.

1. Preparation: 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.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-½ by 11 inches, but no larger than 30 by 40 inches.

4. Number of Copies: Submit one correctable, translucent, reproducible print and one black-line print of each submittal. Engineer through Architect will return the reproducible print.

5. Number of Copies: Submit 6 prints where prints are required for operation and maintenance manuals. Engineer and Architect will retain one print each; remainder will be returned.

D. Coordination Drawings:

1. Coordination drawings shall be prepared on sheets the same size as the contract drawings.

2. Number of submittal copies: Submit one reproducible copy of the coordination drawing. Engineer through Architect will return the reproducible.

3. Number of copies after approval: After approval, submit one black line copy of the coordination drawings for the record copy.

4. Refer to Division One for additional coordination requirements.

## PART 3 - EXECUTION

### 3.1 GENERAL:

A. Review of submittals by Engineer is to insure general quality conformance with the contract documents. The contractor assumes all responsibility for dimensions, quantities, conditions that pertain to the fabrication and installation, and for processes and techniques of construction.

B. Review of submittals or shop drawings by Engineer does not relieve Contractor of responsibility for errors or omissions during the submittal process. Submittal review does not relieve the contractor of any obligation in the contract documents.

C. Products of one manufacturer have been scheduled or specified as the basis of design. Any modifications to ductwork, piping, wiring, building structure, etc. that results from the use of any other products shall be coordinated by this contractor with all trades prior to delivery of approved product from the manufacturer. All modifications required shall be performed without incurring any additional cost to the Contract. Contractor shall document all modifications on the as-built record plans.

3.2 CONTRACTOR'S REVIEW:

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

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.

3.3 ENGINEER'S ACTION:

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved - Fabrication/Installation may be undertaken.
2. Approved as Noted - Fabrication/Installation may be undertaken.
3. Revise and Resubmit - Fabrication/Installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.
4. Rejected - Fabrication/Installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.

C. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

3.4 SUBMITTAL SCHEDULE:

A. See Attachment.

END OF SECTION 15015

## SECTION 15015 – ATTACHMENT

## SUBMITTAL SCHEDULE

15010 ..... Mechanical General

- ❑ Certificates of Inspection and Approval.
- ❑ Qualification of Superintendent.
- ❑ Warranties.
- ❑ List of proposed material manufacturers.
- ❑ Operating and Maintenance Manuals.
- ❑ Record as-built prints.
- ❑ Record electronic as-built drawings.

15015 ..... Mechanical Submittals

- ❑ N/A.

15050 ..... Basic Materials and Methods

- ❑ Access Panels
- ❑ Firestopping
- ❑ Sound stopping
- ❑ Pipe identification

15140 ..... Supports and Anchors

- ❑ Manufacturer's Data Sheets on all catalog items to be used.
- ❑ Sketches covering all specially designed assemblies and fabrications.
- ❑ Sketches showing:
  - ❑ Locations,
  - ❑ Loads,
  - ❑ Calculated travel,
  - ❑ Types and sizes of all spring hanger assemblies.
- ❑ Sketches covering all anchor and guide assemblies.

15241 ..... Seismic Restraints

- ❑ Manufacturer's data sheets on restraint hardware, mounting bolts and miscellaneous attachments, and installation details.
- ❑ A plan or isometric is required to locate all restraints, with a table indicating types, and seismic forces.
- ❑ Supporting calculations, calculations shall be stamped by a registered engineer.
- ❑ Manufacturer's literature on all hardware and materials.
- ❑ A field installation manual, which details for the installing tradesmen the material and installation techniques required.

15260 ..... Insulation (HVAC and Plumbing)

- ❑ Insulation
- ❑ Jacketing
- ❑ Tapes
- ❑ Hardware
- ❑ Mastics
- ❑ Adhesives

- ❑ Submittals shall use pages from Midwest Insulation Contractors Association - "Commercial and Industrial Insulation Standards" for defining how insulation materials will be applied.

15410 ..... Plumbing Piping

- ❑ Valves.
- ❑ Fittings.
- ❑ Test results for:
  - ❑ Pressure
  - ❑ Disinfection

15430 ..... Plumbing Specialties

- ❑ Manufacturer's literature indicating model numbers and options for:
  - ❑ Cleanouts
  - ❑ Water Hammer Arresters
  - ❑ Balancing Valves
  - ❑ Pressure Reducing Valves
  - ❑ Trap Seals
  - ❑ Floor Drains
  - ❑ Backflow Preventer
  - ❑ Wall Hydrants
  - ❑ Hose Bibbs
  - ❑ Thermostatic Mixing Valves

15440 ..... Plumbing Fixtures

- ❑ Manufacturer's data sheets and dimensional information on all fixtures and accessories.
- ❑ List of each component and accessory of the fixture, including manufacturer's model number.

15450 ..... Plumbing Equipment

- ❑ Water Heaters
  - ❑ Manufacturers Data Sheets
  - ❑ Certified Dimensional Drawings
- ❑ Identification number of each item, such as "WH-1 Water Heater", and a list of each component, accessories, and options.

15671 ..... Heat Pump Units

- ❑ Unit capacity
- ❑ Dimensions
- ❑ Power Requirements
- ❑ Connections
- ❑ Sound Power Level
- ❑ Control & Wiring Diagrams

15853 ..... Heat Pump Unit – Indoor Section

- ❑ Indoor Units:
  - ❑ Capacity.
  - ❑ Dimensional Information
  - ❑ Electrical Requirements
  - ❑ Filter.
- ❑ Outdoor Units:
  - ❑ Capacity.

- ❑ Dimensional Information.
- ❑ Electrical Requirements.

- ❑ Controls:
  - ❑ Manufacturer's Data Sheets,

15870 ..... Power Ventilators

- ❑ Dimensional information.
- ❑ Electrical connection and motor data.
- ❑ List of accessories or auxiliary items.
- ❑ Roof curb details and dimensions.
- ❑ Sound power levels at the mid frequency of each band.

15886 ..... Air Filters

- ❑ Manufacturer's literature.
- ❑ UL listing information.

15887 ..... Air Purification System

- ❑ Product Data for ion generators including:
  - ❑ Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
  - ❑ Data sheet for each type of plasma generator, and accessory furnished indicating:
    - ❑ construction,
    - ❑ sizes,
    - ❑ mounting details.
  - ❑ Performance data for each type of plasma device furnished.

  - ❑ Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled.
  - ❑ Product drawings detailing all physical, electrical and control requirements.
  - ❑ Copy of UL 867 independent ozone test.
- ❑ Operating & Maintenance Data:
  - ❑ Submit O&M data and recommended spare parts lists.

15892 ..... Low Pressure Ductwork

- ❑ Sheet Metal:
  - ❑ Gages by sizes.
  - ❑ ASTM Standards.
- ❑ Duct Fabrication Standards and Reinforcement:
  - ❑ Joint construction.
  - ❑ Fitting construction.
  - ❑ Joint and reinforcement spacing.
  - ❑ Splitter damper and duct tap details.
  - ❑ Flange details.
- ❑ Hangers:
  - ❑ Rods - sizes by duct.
  - ❑ Straps.
  - ❑ Trapeze.
  - ❑ Spacing.
- ❑ Duct sealers.
- ❑ Flexible connectors.
- ❑ Flexible ductwork.
- ❑ Dampers:

- ❑ Factory fabricated.
- ❑ Fire dampers.
- ❑ Damper hardware.

- ❑ Access doors.
- ❑ 1/4-inch scale shop drawings indicating location and mounting height of duct.
- ❑ Testing or listing certification, dimensional data and manufacturers literature on all manufactured products.

15906 ..... Temperature Controls

- ❑ Manufacturer's data sheets of all products (original copies).
- ❑ Fully labeled elementary diagram (electrical ladder diagram).

15936 ..... Registers, Grilles, and Diffusers

- ❑ Manufacturers technical literature for:
  - ❑ Performance.
  - ❑ Static pressure drop.
  - ❑ Throw.
  - ❑ Sound pressure loss (NC).
- ❑ Pictorial literature.

15990 ..... Testing, Adjusting, and Balancing

- ❑ 2 copies of evidence that the Testing, Adjusting, and Balancing Agent and this Project's Testing, Adjusting, and Balancing team members meet the qualifications specified in the "Quality Assurance" Article.
- ❑ 2 copies of the Contract Documents review report as specified in Part 3.
- ❑ 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- ❑ 8 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- ❑ 2 sets of sample testing, adjusting, and balancing report forms.
- ❑ 2 copies of special warranty specified in the "Warranty" Article.

SECTION 15050 - BASIC MATERIALS AND METHODS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. Provide equipment, labor, materials, etc. required to make a complete working installation as shown or as specified.

### 1.2 SUBMITTALS:

A. Provide submittals for:

1. Access panels
2. Firestopping
3. Sound stopping
4. Pipe identification

## PART 2 - PRODUCTS

### 2.1 CONCRETE HOUSEKEEPING PADS:

A. Concrete shall be 3000 psi at 28 days minimum.

### 2.2 ACCESS PANELS:

A. Access panels shall have welded steel frame, one piece doors, and self latching door locks.

B. Panels shall be Milcor, Cesco, Karp or prior approved equal. Milcor model numbers are cited as examples.

| Construction or Material Surface | Model No. |
|---|---|
| Fire rated walls or ceiling<br>1-1/2 Hr, B-Label<br>16 ga frame, 20 ga door | Fire Rated-Primer Finish |
| Drywall walls and ceilings<br>16 ga frame, 14 ga door panel | DW primer finish |
| Plaster walls and ceilings<br>16 ga frame, 14 ga door | K - primer finish |
| Masonry and Tile | M - primer finish<br>MS - stainless steel |

C. Locks: Standard locks shall be screw driver operated with case hardened steel cam. Cylinder lock shall be furnished in public spaces. Provide two keys per panel.

### 2.3 FIRESTOPPING AND SOUNDSTOPPING:

A. Firestopping materials shall conform to ASTM E 814 and E 119.

B. Penetration Sealants:

1. Flame Stop Distribution, Inc., Flame Stop V.

2. 3M Brand "Fire Barrier" CP 25 WB + Caulk

3. 3M Brand Moldable Putty "Pads" and Moldable Putty MPS-2 "Stix"

C. Intumescent Sealants for use in openings and sleeves involving plastic pipe, insulated pipe or flexible cable:

1. Flame Stop Distribution, Inc. Flame Stop VP with Retaining Fixture.

2. 3M Brand "Fire Barrier" Caulk, with FS-195 + Wrap Strip and CS-195 Composite Sheet.

D. Sound stopping material shall be .75 lb per cu. ft. density fiberglass.

E. Other acceptable manufacturer's include GE "Pensil", Dow Corning, Hilti.

2.4 MISCELLANEOUS STEEL:

A. ASTM A-36 Structural Steel

2.5 PIPE IDENTIFICATION:

A. Identification shall be in accordance with ANSI-A13.1. Pipe markers shall be Brady B-946 or Seton's Weather-Code.

2.6 PIPE SLEEVES:

A. Sleeves in concrete walls, floors or masonry - Sch 40 steel pipe, machine cut.

B. Sleeves in gypsum board or plaster walls - 14 gauge, rolled galvanized sheet metal. Tack welded on the longitudinal seam.

PART 3 - EXECUTION

3.1 CONCRETE HOUSEKEEPING PADS:

A. Provide concrete housekeeping pads under all floor mounted equipment, pipe support and duct supports and where indicated.

B. Housekeeping pads shall be not less than 3 ½ thick, sized at least 8 in. larger than the equipment.

C. Pads shall be doweled to floor with not less than 4 No. 4 bars grouted in place.

D. Pads shall have chamfered edges.

E. Pads shall receive a broom finish.

NOTE: Anchor bolts for equipment shall be poured integral with the pad.

F. Pads shall be reinforced with at least one No. 4 bar (stirrups).

3.2 ACCESS PANELS:

A. Provide access panels in walls and ceilings as needed to allow access to valves, equipment, shock absorbers, trap primers, etc. and where noted.

B. Access doors shall be selected for the type of wall or ceiling where needed. All locking access panels shall be keyed alike.

3.3 FIRE STOPPING AND SOUND STOPPING:

A. Provide penetrations for piping through floors and walls for work under this contract.

B. Penetrations through floors and fire resistant walls shall be sealed to the rated fire resistance equal to the wall. Installation shall be done by a qualified installer, approved by the manufacturer.

C. Provide sound proofing through non-rated walls.

D. In an existing building all penetrations through floors and fire resistant walls shall be sealed at the end of each working day. These closures shall have an equal fire resistance rating to the floor or wall.

3.4 CUTTING AND PATCHING:

A. Contractor shall be responsible for cutting and patching.

B. Cut walls, floors, ceilings, partitions, etc., required for the installation of this work in a neat and careful manner. Core drill for pipe sleeves and other openings through floors and walls. Sawcut larger openings. Cutting shall be kept to a minimum. Obtain approval of Architect before cutting or drilling.

C. Replace or repair ductwork, conduit, piping, etc., that is cut. Patch around opening cut by this Contractor or provided by others for him. Patching shall be done by an approved qualified contractor, but shall be paid for by this Contractor. Finished patching shall retain fire and smoke ratings of the assembly and shall match surrounding finish.

3.5 ANCHORS:

A. Mount all equipment, brackets, hangers, anchors, etc. to safely resist the vibration or thrust forces and support the unit's weight.

B. Floor mounted rotating or vibrating equipment shall be anchored to the floor using grouted-in-place or cast-in-place anchor bolts with three inch hook and sleeve. Anchor bolts shall be of the size recommended by the manufacturer.

C. Floor mounted static items, wall and ceiling mounted equipment bracket and hangers shall be installed using drilled anchors. Anchors shall be Phillips Drill Company "Red Head" or Multi-Set II. Size anchors for four times the applied load. Bolts used outdoors or in a wet environment shall be hot dip galvanized.

3.6 PIPE SLEEVES:

A. Provide pipe sleeves where pipes pass through floors and walls above or below ceilings. Provide pipe sleeves in new walls and floors as the work progresses. Provide split pipe sleeves in new walls built up around existing pipes. Tack weld split sleeves together.

B. Size pipe sleeves to allow continuous insulation, but not less than two pipe sizes larger than pipe.

C. Sleeves in walls shall be flush with wall, sleeves in floors shall extend 3/4 inches above floor and be flush with structure below.

3.7 PIPE IDENTIFICATION:

A. Provide pipe markers and directional arrows on pipes at both sides of partitions and floors slabs, at branch line take-offs, at valves, at intermediate intervals not in excess of 20 ft. and at connections to equipment.

B. Tape color band identifying markers and arrows on each pipe, both insulated and bare pipes. Pipe markers and arrows shall be located where readily visible and on lower quadrants of overhead pipes.

C. Submit schedule of pipe markers, with legend and background colors for approval by the Engineer.

3.8 EQUIPMENT IDENTIFICATION:

A. Identify each piece of equipment with a 1/8 inch thick engraved melamine plastic laminate nameplate. Letters shall be ½ inch high standard style. Names, abbreviations, and numbering shall agree with the corresponding equipment designations shown on the drawings. Use black letters cut in a white background for all equipment.

B. Fasten nameplates to equipment in a conspicuous location using self-tapping stainless steel screws, except use contact epoxy adhesive where screws cannot or should not penetrate substrate.

3.9 REFRIGERANT RECOVERY:

A. All work on refrigerant systems shall employ service techniques that prevent release of refrigerants to the atmosphere.

B. Remove all refrigerant. Place refrigerant in DOT approved containers for recycling/re-use.

3.10 WORKMANSHIP:

A. Pipe size changes shall be made at reducing fittings. Bushings shall not be used.

B. Provide drain valves at points where water is trapped in piping.

C. Install pipe to prevent noise or water hammer.

D. Blowout or flushout all lines prior to final connection or start-up, to remove foreign matter.

E. Make allowance in piping for expansion and contraction, for installation of insulation and to avoid air pockets.

F. Do not tap small pipes into larger pipes. Provide fittings or reinforced branch connections.

G. Cut pipes ends square, ream and de-burr. Cut threads clean and sharp. Pipe threads shall conform to ANSI B 2.1.

H. Pull up threaded fittings to a tight fit with an approved good quality pipe joint compound applied to male threads.

I. Inspect screwed joints for leakage and remake each joint that appears to be faulty. Do not wait for rust to form. Clean threads on both parts apply compound and remake joints.

J. Clean piping strainers after start-up by removing strainer screen and wire brushing.

K. Conceal pipes in pipe shafts, partitions and furred spaces except where otherwise distinctly indicated on the drawings. Each riser shall be separately valved.

L. Every branch pipe shall be controlled by a valve where it connects to the supply main or riser.

M. Valves shall be easily accessible, with proper clearance for maintenance. Valves inside furred spaces, behind access doors shall be grouped to keep the number of access doors and their sizes to a minimum.

N. Provide drain valves at the base of each riser.

O. Provide drain valves and drain lines from pumps, heaters, water cooled equipment, relief valves, etc., and pipe to floor drains.

P. Tighten flanges and packing glands after the system has been placed in operation. Replace gaskets in flanges that show any signs of leakage after tightening.

Q. Install NO piping in electrical switchgear room, transformer vaults, telephone rooms or electrical closets. Provide drip pans under drain piping above electrical switchgear in mechanical rooms.

R. Install piping in alignment with and parallel to the walls of the building. All risers shall be plumb.

S. No cross connections shall be installed between potable water systems and polluted supply or waste systems.

T. Provide valves and unions or flanges at equipment such as pumps, coils, tanks, automatic valves, heat exchangers, etc. Provide valves on capped branches for extension by other contractors.

U. Support piping at the proper intervals. Adjust pipe hangers and supports for correct pitch and alignment. Brace piping systems which sway.

V. Remove rust, scale, and foreign materials from equipment and renew any defaced surfaces. If equipment is marred, provide new materials.

W. Protect insulation. Repair insulation that is damaged. Keep it dry and free of tears. Allow no punctures in vapor barrier. Insure good tape adhesion. Provide smooth surfaces in finished areas.

X. Pitch sanitary and storm lines: pipes 3 in. and larger not less than 1/8 inch per foot, pipes 2 inch and smaller not less than 1/4 inch per foot. Make changes in grade or direction by "Y" branches.

Y. Pitch vent piping to free themselves of water and condensation. Install vent branches not less than 42 inches above floor. Clean fixtures of labels and stains with whiting and alcohol. Clean copper tubing and fittings with steel wool to remove traces of oxidation.

Z. Install ductwork to allow adequate clearance for maintenance. Locate fire dampers and access doors to allow replacement of fusible links. All dampers shall be accessible.

AA. All copper tubing shall be hard drawn unless noted otherwise. Annealed tubing where used shall be stretched, and installed with tool formed bends.

END OF SECTION 15050

SECTION 15140 - SUPPORTS AND ANCHORS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the fabrication and installation requirements for equipment supports, pipe supports and brackets.

### 1.2 SUBMITTALS:

A. Submittals shall include the following information and data:

1. Manufacturer's Data Sheets on all catalog items to be used.

### 1.3 STANDARDS:

A. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.

| | | |
|---|---|---|
| B. | Standard SP-58 | Pipe Hangers and Supports-Materials, Design and Manufacture |
| C. | Standard SP-69 | Pipe Hangers and Supports-Selection and Application |
| D. | Standard SP-89 | Pipe Hangers and Supports-Fabrication and Installation Practices. |
| E. | Standard SP-90 | Guidelines on Terminology for Pipe Hangers and Supports |
| F. | ANSI/ASME B31 | Codes for Pressure Piping |
| G. | ASME | Boiler and Pressure Vessel Codes |
| H. | UL 203 | Standard for Pipe Hanger Equipment for Fire Protection Service |
| I. | WW-H-171E | Federal Specification, Hangers and Supports, Pipe |
| J. | AISC | Manual for Steel Construction |

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Hangers for suspending pipe 2-1/2 in. and larger shall be capable of vertical adjustment.

B. Steel and malleable iron hangers sized for copper tubing shall be copper plated.

C. Hangers, devices and hardware located outdoors shall be hot dip galvanized.

Horizontal Pipe Attachments: (PVC Pipe, and Copper Tubing larger than four inches) Type numbers as defined in MSS-SP-58

-- INDICATES NOT NORMALLY USED
X INDICATES ACCEPTABLE APPLICATION
NA INDICATES NON-ALLOWABLE

| TYPE 1<br><br>Adj. Steel Clevis Hanger | (INSULATED)<br>Hot Lines<br><br>X Note 1 | (UNINSULATED)<br>Ambient<br><br>X | (INSULATED)<br>Cold<br><br>X | FIRE PROTECT. U.L. LISTED | (UNINSULATED)<br>PLUMBING<br><br>X |
|---|---|---|---|---|---|
| TYPE 3 Double Bolt Pipe Clamp | NA | X | NA | X | X |
| TYPE 4 Steel Pipe Clamp | NA | X | NA | X | X |
| TYPE 5 Pipe Hanger | NA | NA | NA | NA | NA |
| TYPE 10 Adj. Swivel ring Band Type | NA | NA | NA | NA | NA |
| TYPE 36 Pipe Saddle Support | X Note 1 | X | X Note 1 | NA | X |
| TYPE 37 Pipe Stanchion Saddle | X Note 1 | X | X Note 1 | NA | X |
| TYPE 38 Adj. Pipe Saddle Suppor | X Note 1 | X | X Note 1 | NA | X |
| TYPE 41 Single Pipe Roll | X Note 3 | -- | X Note 1 | -- | -- |
| TYPE 43 Adj. Roller Hanger w/ Swivel | X Note 3 | -- | -- | -- | -- |
| TYPE 44 Pipe Roll Complete | X Note 3 | -- | -- | -- | -- |
| TYPE 45 Pipe Roll & Plate | X Note 3 | -- | -- | -- | -- |

| | | | | | |
|---|---|---|---|---|---|
| TYPE 46 Adj. Pipe Roll & Base | X Note 3 | -- | -- | -- | -- |

NOTE:
1. Hangers on insulated piping systems shall incorporate protection saddles or shields (MSS-SP-58).
2. The design shall be in accordance with MSS SP-58.
3. For shields used with rollers or subject to point loading, see table for Type 39 saddles (MSS SP-58).
4. Continuous inserts, anchor bolts and concrete fasteners may be used as specified by the Engineer.

Motion and Movement Control

| Item | MSS-SP-69 Type No. |
|---|---|
| Roller Hanger with Swivel | 43 |
| Pipe Roll | 44, 45, 46 |
| Restraint | 47 |
| Spring Cushion | 48 |
| Spring Cushion Roll | 49 |
| Spring Sway Brace | 50 |
| Variable Spring Hanger | 51 |
| Variable Spring Base Support | 52 |
| Variable Spring Trapeze Hanger | 53 |
| Constant Support-Horizontal | 54 |
| Constant Support Vertical | 55 |
| Constant Support Trapeze | 56 |
| Horizontal Traveler | 58 |

2.2 MISCELLANEOUS:

A. Hanger Rod - ASTM-A36 or A 575 Threaded Hot Rolled Steel

B. Upper Attachments

| Item | MSS SP 69 TYPE NO. |
|---|---|
| Side Beam or Channel Clamp | 20 |
| Center Beam | 21 |
| Welded Beam Attachment | 22 |
| C-Clamp | 23 |
| Top Beam Clamp | 25 |

2.3 STRUCTURAL STEEL:

A. All structural steel components used in the fabrication of supports, guides, etc. shall be ASTM A-36 or ASTM A 500 Grade A or B structural steel.

PART 3 - EXECUTION

3.1 GENERAL:

A. Repair/replace fire proofing on structural beams where it is removed or damaged for work under this section. Repair/replacement shall be done by an approved and qualified tradesman.

B. Drill for anchors in structural slabs and walls. Anchors shall be Phillips Drill Company "Red Head", or Multi-Set II. Hilti Fasteners, Rawlplug Company and Wej-it Corporation are approved equal. Powder actuated fasteners are prohibited.

C. Support piping independent of pumps, adjacent piping and equipment.

D. Structural supports shall be designed in accordance with AISC - Manual for Steel Construction. Support from the floor all horizontal piping with a centerline elevation less than four feet from the floor.

3.2 STRUCTURAL STEEL:

A. All steel framing, weldments and miscellaneous steel necessary for the installation of supports, etc. shall be designed in accordance with the AISC Steel Handbook. Steel shall be shop fabricated, furnished by the contractor. Steel shall receive one shop coat of primer.

B. Attach wall mounted pipe supports for exposed piping on dry wall construction to angle or channel supports framed into wall studs.

C. Support exposed piping on walls with split cast iron pipe holders.

D. Support piping systems by using standards manufactured hangers and supports wherever possible.

E. All pipe hangers and supports shall allow for the expansion and contraction of the piping systems.

3.3 VERTICAL:

A. Support vertical pipe at base and at each floor. In addition, 1 inch or smaller copper pipe shall be supported at 5 foot intervals.

B. Pipe support attachments to the riser piping shall be riser clamp lugs. Welded attachments shall be of material comparable to that of the pipe, and designed in accordance with governing codes.

C. Support vertical pipe independently of connected horizontal pipe. Use riser clamps which

extend beyond the insulation to support the weight of the pipe.

3.4 HORIZONTAL:

A. Use wall brackets to suspend or support pipe runs near walls. Hanger rods shall be used in tension only. Install rods plumb, limit rod travel to 4 degrees from vertical.

B. Multiple adjacent pipes at the same bottom-of-pipe elevation may be supported from Unistrut, Kindorf or B-Line channel trapeze hanger.

SUPPORT SPACING: HORIZONTAL PIPING SUPPORT SCHEDULE (Carbon Steel, Copper and PVC)

| | COPPER | | PVC | |
|---|---|---|---|---|
| NOMINAL PIPE SIZE TUBING O.D. (IN.) | SUPPORT SPACING (FT.) | ROD SIZE (IN.) | SUPPORT SPACING (FT.) | ROD SPACING (IN.) |
| Up to 1/2 | 5 | 3/8 | 3-1/2 | 3/8 |
| 3/4 | 6 | 3/8 | 4 | 3/8 |
| 1-1/4 | 7 | 3/8 | 5 | 3/8 |
| 1-1/2 | 8 | 3/8 | 5 | 3/8 |
| 2 | 8 | 3/8 | 5 | 3/8 |
| 2-1/2 | 9 | 1/2 | 6 | 1/2 |
| 3 | 10 | 1/2 | 6 | 1/2 |
| 4 | 12 | 1/2 | 6-1/2 | 1/2 |
| 6 | -- | -- | 7-1/2 | 5/8 |
| 8 | -- | -- | 8 | 3/4 |

END OF SECTION 15140

SECTION 15242 - VIBRATION ISOLATION AND SEISMIC/WIND RESTRAINTS FOR HVAC&R EQUIPMENT, DUCTWORK, AND PIPING

PART 1: GENERAL

1.1 WORK INCLUDED

A. This Section provides minimum acceptance requirements for vibration isolation and seismic/wind restraints for all heating, ventilating, air-conditioning and refrigeration equipment, ductwork, and piping. Acceptance is determined by the Engineer of Record.

B. The determination of seismic and wind restraints required for non-structural components described in this Division is delegated to a qualified design engineer (Delegated Design Engineer) as defined by this Section.

C. This Section includes requirements for horizontal and vertical pipe support systems, including pipe risers, that use products specified in this Section to provide vibration isolation and to control and accommodate changes in pipe length due to thermal changes.

1.2 QUALITY ASSURANCE

A. Unless otherwise directed by the local authority having jurisdiction, the following codes and standards will apply and take precedence over any perceived or real conflict with this Section:

1. International Building Code

2. International Mechanical Code

3. American Society of Civil Engineers Standard ASCE/SEI

B. Project specific design values shall be used for determining seismic and wind design forces based on the information on the structural drawings. The values below are provided for reference only for the purpose of coordinating with suppliers and other trades. If a conflict exists between these values and the structural drawings, the values on the structural drawings will prevail. Where project documents do not provide values necessary to determine design forces, the Delegated Design Engineer may use values substantiated through the governing building code(s) or the authority having jurisdiction and subject to review and approval by the Engineer of Record.

1. Risk Category: III

2. Seismic Design Category: C

3. Short-period Spectral Response Acceleration parameter ($S_{DS}$): 0.288

C. All vibration isolation and restraint products and associated engineering work shall be provided by one supplying manufacturer. Preferred manufacturer is Vibro-Acoustics. Alternate manufacturers must request and obtain written approval by the Engineer of Record for substitutions. Supplying manufacturer shall be a full member in good standing with the Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) as indicated on the association website: http://www.viscma.com/.

D. Isolation and restraint products shall be tested or analyzed for performance as appropriate and reports shall be made available to the Engineer of Record upon request.

E. All work to determine seismic and wind restraints shall be done by or under the direct supervision of a qualified professional engineer in responsible charge of the work acting as the Delegated Design Engineer. This Delegated Design Engineer must hold an active license in the state or province of the project.

F. The following guides may be used for supplemental information on typical seismic restraint installation practices. Where a conflict exists between the guides and these construction documents, the construction documents will preside.

1. Federal Emergency Management Agency (FEMA) manuals 412, *Installing Seismic Restraints for Mechanical Equipment* and 414, *Installing Seismic Restraints for Ductwork and Pipe.*

2. Sheet Metal and Air-conditioning Contractors' National Association's (SMACNA) *Seismic Restraint Manual Guidelines for Mechanical Systems, 3rd ed., 2008*

3. American Society for Heating, Refrigerating and Air-conditioning Engineers' (ASHRAE) *A Practical Guide to Seismic Restraint, 2nd ed.*

4. Manufacturers Standardization Society of the Valve and Fittings Industry MSS SP-127-2014a, *Bracing for Piping Systems, Seismic – Wind – Dynamic Design, Selection, and Application.*

1.3 SUBMITTALS

A. Provide a submittal report with cover page and summary that details the scope of supply along with project information. Submittals that include seismic and/or wind restraints or include pipe riser support systems shall be sealed per state or province requirements by the Delegated Design Engineer.

B. Provide calculations that indicate the applicable seismic and wind design forces for each non-structural component within the scope of work and that substantiate the selection of restraints and attachments, including anchorage to structure. Calculations must be project- and product-specific; generic calculations are not acceptable.

C. Provide submittal drawings for all products specified herein and as indicated and scheduled on the drawings. Submittals shall indicate product locations, installation instructions, and full compliance with the product specification in Part 2. Any deviation shall be specifically noted and subject to Engineer of Record approval. Submittals shall include product capacity, ratings, dimensions, placement, attachment, and anchorage requirements.

D. Provide summary reports of testing or analysis for any customized restraints, snubbers, and support structures such as equipment bases and roof curbs at Engineer of Record's request. The summary report shall indicate adequate capacity for the project design forces– including all gravity, wind, and seismic loads.

E. Provide a detailed submittal for pipe riser support systems as indicated in Part 3 of this Section or as shown on the Drawings that includes, as appropriate, initial load, initial deflection, change in deflection, and final load at all isolator and anchor support locations. Submittal shall indicate locations for all supports, anchors, expansion compensators, and guides.

PART 2: PRODUCTS

2.1 GENERAL:

A. Springs: All springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. All springs except internal booster springs shall have an outside diameter not less than 0.8 of the compressed height of the spring. Ends of springs shall be square and ground for stability. Laterally stable springs shall have $k_x/k_y$ ratios of at least 0.8. All springs shall be fully color-coded to indicate capacity – color striping is not considered adequate.

B. Rubber Components: All rubber components shall be made of Neoprene or EPDM. Rubber compound shall be suitable for outdoor use to withstand UV and ozone exposure. Mounts, pads, or hanger elements of different durometers within a series shall be color coded for easy identification. Load vs. deflection test data shall be available upon request for all main isolation components and bottom cups that are located under springs.

C. Corrosion Protection: All springs shall be powder-coated enamel. Hardware shall be zinc-plated. Isolator housings shall be galvanized, powder-coated enamel, or painted enamel for indoor use and hot-dip galvanized for indoor or outdoor use. Unless otherwise specified, stands, bases, brackets, anchors, guides, and steel frames shall be prime painted, zinc-plated, black oxide coated, painted enamel, or powder-coated enamel for indoor use and hot-dip galvanized for outdoor use.

D. Capacity Ratings: Products that are selected to withstand seismic and wind loads shall have their load capacities in all appropriate axes determined by testing in accordance with ANSI/ASHRAE 171 or through analyses or through an approved combination of both. Supporting test reports shall be made available upon request.

2.2 VIBRATION ISOLATORS:

A. Vibration Isolation Pads:

1. Type NP – Rubber pad type isolators, 7/8" (22 mm) minimum thickness molded from high strength compound with minimum 2,750 psi (19 MPa) tensile strength. Pads shall be color coded for capacity and sized to deflect 20% of the overall height (0.18" (4.5 mm) for 7/8" (22 mm) thick pad). Maximum allowable deflection is 25% of the overall height (0.22" (5.5 mm) for 7/8" (22 mm) thick pad). Pads shall allow for anchor bolts to be installed through them with or without clamping nuts and without altering the published load vs. deflection performance for a given size.

2. Type N – Rubber pad type isolators, 3/8" (10 mm) minimum thickness and ribbed on both sides. Pads shall be sized to deflect 20% of the overall height (0.07" (2 mm) for 3/8" (10 mm) thick pad).

Additional steel plates shall be furnished as required with pad type isolators either for stacking purposes to provide increased height or increased deflection, or for load distribution purposes. All layers shall be affixed together using appropriate glue or double sided tape to prevent delamination.

B. Grommet Washers: Type GW – Rubber grommet washers of sufficient size to accommodate USS standard washers, long enough to sleeve through 1/4" (6 mm) plate material, and with at least 1/8" (3 mm) thick material around bolt holes.

C. Rubber-in-Shear Floor Mounts: Type RD – "Double-deflection" rubber isolators, with rubber-coated metal surfaces, internal threaded holes for securing components, and bolt holes for securing to structure.

D. Restrained Rubber-in-Shear Floor Mounts: Type SRD – "Double-deflection" rubber isolators with mounting brackets and all-directional snubbers for seismic and wind restraint. Snubbers shall include elastomeric components to prevent metal-to-metal contact under normal operation and during a seismic or extreme wind event.

E. Free Spring Floor Mounted Isolators:

1. Type FS – Free-standing, laterally stable, unhoused spring isolators with vertical studs for supporting, leveling, and securing equipment. Springs shall be supported with rubber cups with steel inserts that can be bolted to structure.

2. Type FST – same as Type FS with the addition of top plates for supporting components.

F. Restrained Spring Floor Mounted Isolators:

1. Type CSR – Laterally stable, vertically restrained spring isolators with welded steel housings and heavy top plates for supporting components. Springs shall be supported with rubber cups with steel inserts. Housings shall include vertically restraining limit stops (hold-down plates). Minimum clearance between metal components before contact is made shall be 1/4" (6 mm). Top plates and restraining bolts shall be out of contact with housings during normal operation and rubber grommets shall be incorporated to minimize metal-to-metal contact.

2. Type SCSR – Laterally stable, restrained spring isolators with housings and heavy top plates for supporting components. Isolators shall be designed to withstand seismic and wind forces. Springs shall be supported with rubber cups with steel inserts. Housings shall be of welded high grade steel construction and include restraining limit stops (hold-down plates). Maximum clearance around restraining bolts shall be 1/4" (6 mm). Top plates and restraining bolts shall be out of contact with housings during normal operation and all-directional heavy duty snubbers shall be incorporated to minimize metal-to-metal contact. Isolators shall be furnished with factory installed oversized base plates for anchor load distribution purposes where required.

3. Type SFS – Laterally stable, restrained spring isolators with vertical studs for supporting and securing components. Springs shall be supported with rubber cups. Housings shall include integral all-directional limit stops and heavy duty snubbers preventing metal-to-metal contact and with minimum 1/4" (6 mm) clearance under normal operation.

G. Closed Mount Spring Isolators: Type CM – Floor mounted spring isolators with housings and telescoping equipment support plates with vertical studs for securing components. Springs shall be supported either with rubber cups or metal base plates complete with ribbed rubber pads, minimum 1/4" (6 mm) thick, bonded to base plates. Housings shall incorporate rubber stabilizers to minimize short circuiting and provide vertical damping.

H. Rubber Hangers: Type NH – "Double-deflection" rubber hanger isolators, complete with integral rubber sleeves through housing. Rubber elements shall be color-coded to identify load capacities and include either internal or external metal washers to prevent

pull-out failure. NH hangers shall be furnished with vertical uplift stop washers where used to support seismically restrained components.

I. Spring Hangers: Vibration isolator hanger supports with steel springs and welded steel housings. Hangers rated for loads above 200 lbs (0.9 kN) shall be designed for a minimum of 15 degree angular misalignment from vertical before support rod contacts housing. Spring hangers shall be furnished with vertical uplift stop washers where used to support seismically restrained components.

1. Type SH – Spring hanger isolators complete with springs, compression cups, and rubber washers. Pre-compressed versions shall include hardware to compress springs prior to installation and be shipped

2. Type SHR – Combination spring and rubber hanger isolators complete with springs, compression cups, and rubber "double-deflection" elements at top of hangers. Isolators rated for 2000 lbs (8.9 kN) and above may use Type NP pad isolators in place of double-deflection elements.

3. Type SHB – Spring hanger isolators with rubber bottom cups complete with springs, compression cups, and rubber cups under springs.

4. Type SHRB – Combination spring and rubber hanger isolators with rubber bottom cups complete with springs, compression cups, rubber "double-deflection" elements at top of hangers, and rubber cups under springs.

5. Pre-compressed versions (Types PSH, PSHR, PSHB, PSHRB) of each of the above spring hanger models shall include hardware to compress springs prior to installation and shall be shipped pre-compressed to 2/3 of rated load.

J. Thrust Restraints: Spring assemblies used to limit the motion of base-mounted (Type HCS) or suspended fans (Type AHCS) due to aerodynamic thrust forces. Thrust restraints shall be designed for use in pairs of assemblies and include all brackets and hardware necessary for installation, precompression, and adjustment. Operating clearances shall be nominal ¼" to ensure no short circuiting of isolation.

2.3 BASES:

A. Steel Equipment Base: Bases shall be constructed of structural steel members with cross members to form an integral support platform. Steel deflection shall be limited to 1/360$^{th}$ of the longest span but not to exceed 1/4". Minimum clearance under steel equipment bases shall be 1". Bases shall be designed for specific support points, both for the equipment on top and the support points below.

1. Type CTB – bases typically used for cooling towers and consisting of W-shaped structural steel beam main supports and cross bracing to create a rectangular base with bolted or welded joints. Bases shall include pre-drilled holes for attaching equipment. Bases shall be engineered for all design lateral loads as well as vertical loads. Design calculations shall be available upon request.

2. Type IFB – bases typically used for supporting fans and their associated motors with structural angle main support beams and cross braces. Bases for fans shall have adjustable motor slide rails as indicated on the Schedule and shall accommodate motor overhang where required.

B. Concrete Inertia Base: Inertia bases shall be of welded steel or formed sheetmetal construction with concrete in-fill supplied by the installing contractor on site and shall incorporate minimum #4 reinforcing bars, welded 12" to 18" maximum on centers each way. Inertia bases for end suction and split case pumps shall be of sufficient size to accommodate supports for pipe elbows at pump suction and discharge connections. Inertia bases for fans shall include motor slide rails as required. The weight of each inertia base shall be at least equal to the weight of the equipment mounted thereon. Inertia bases shall be of minimum 6" thickness. Height-saving brackets or welded steel pockets shall be incorporated to ensure a 1-1/2" minimum clearance under each base. Equipment bolting templates shall be provided when required or scheduled. Bottom pans may be provided at contractor option but shall be minimum 16ga sheetmetal.

1. Type CIB – Rectangular frame concrete inertia base typically used with fans, end suction pumps, and other base-mounted equipment.

2. Type TCIB – T-Shaped frame concrete inertia base typically used with double suction pumps with suction and discharge piping supported on each side of the pump.

3. Type LCIB – L-Shaped frame concrete inertia base typically used with double suction pumps with suction piping supported on one side.

2.4 SEISMIC/WIND RESTRAINTS:

A. Cable Restraints:

1. Type BB – Preassembled, adjustable sway bracing restraints made with 7x19 galvanized steel aircraft cable, brackets or stake eyes, and thimbles sized to resist design loads and packaged together in pairs. Cable restraints shall use securement devices with set and locking screws that allow quick cable length adjustment to remove excessive sag.

2. Type BBR – Type BB restraints with one end complete with a hook-style bracket suitable for retrofit applications.

3. Type SRK – sway bracing restraints made with 7x19 wire rope using brackets, thimbles, and wire rope clips for securement devices. Where restraints are exposed to corrosive environments they shall be made with stainless steel materials.

B. Rigid Restraints: Type RRK – rigid sway bracing restraints made with lengths of standard 1-5/8" (41 mm) square strut and heavy duty brackets made of high-strength, low alloy steel. Brackets shall be of a universal design for attachment to both structure and restrained component and shall accommodate retrofit installation.

C. Beam Clamps: Type BC – Seismically rated beam clamps for attachment of restraints to structural steel without drilling. Beam clamps shall be constructed of ductile cast frames, case hardened cone point set screws and related hardware.

D. Hanger Rod Stiffener Clamps: Type VAC – Formed steel clamps used to secure structural angles to threaded rod supports complete with securing bolts and locking nuts.

E. Support Stands:

1. Type SIPS – trapezoidal-shaped rigid support stands made of high strength, low alloy steel designed to be bolted to pipe flanges which support vertical inline pumps and other flanged components. Stands shall include cut-outs to accommodate pump body gussets and rubber grommet washers preinstalled in mounting holes for anchor bolts.

2. Type SIPS-NP – Type SIPS stands complete with vibration isolation pads for reducing vibration transmission into the supporting structure.

3. Type SPS – rigid support stands made with round hollow steel sections, designed to support pipe weight and withstand lateral seismic forces.

4. Type SPSA – rigid support stands made with round hollow steel pipe or sections, designed with an adjustable element to accommodate different pipe sizes and elevations.

F. Brackets and Snubbers:

1. Type SRB – Formed steel brackets for securing floor-mounted equipment complete with pre-drilled holes. Brackets shall be furnished with grommet washers for vibration isolated equipment and shall be painted enamel or powder-coated enamel for indoor or outdoor use.

2. Type DAB – Formed steel brackets that allow use of two anchors to secure sway bracing restraints to structure. Brackets shall be designed for use with wood, monolithic concrete, and concrete on metal deck installations – both B-deck and W-deck versions shall be available.

3. Snubbers: Structural steel shapes with contact surfaces covered with rubber to cushion impact forces. Snubbers shall be designed to limit excessive vibration isolated equipment motion due to wind or seismic loads to no more than 1/4" (6 mm) in any direction.

G. Anchor Bolts:

1. Post-installed anchor bolts in concrete and masonry shall be qualified for seismic/wind restraint applications as appropriate.

2. Mechanical anchor bolts: Concrete screw type, drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Anchor bolts shall be tested and qualified for use in accordance with ACI 355.2 and ICC-ES AC193.

3. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Anchor bolts shall be tested and qualified for use in accordance with ACI 355.4 and ICC-ES AC308.

2.5 FLEXIBLE CONNECTORS AND EXPANSION JOINTS:

A. Rubber Expansion Joints: Synthetic rubber tube and cover construction, molded and cured in hydraulic presses using either EPDM (Type EJE) or neoprene (Type EJN) as specified or as required by the application. Rubber expansion joints shall be reinforced

with multi-ply Nylon tire cord fabric; internal reinforcing of metal wire or embedded rings are not acceptable. Rubber expansion joints shall either be single sphere (EJE1 OR EJN1) or double sphere (EJE2 OR EJN2) as specified or as required by the application. Double sphere rubber expansion joints shall have a factory installed steel body ring between the two spheres to control ballooning under high pressure/temperature situations. Rubber expansion joints for pipe sizes 1-1/2" (40 mm) and up will have floating steel flanges. The mating surface will be 100% rubber. For sizes 3/4" (20 mm) up to 3" (80 mm), threaded female union connectors are also accepted. Control rods or cables shall be installed to prevent excessive elongation where required. Control rods shall utilize 1/4" (6 mm) thick rubber grommets to limit vibration transfer.

B. Metal Bellows Expansion Joints: Type EJM – Bellow pump connectors with series 300 stainless steel multi-ply bellows construction welded to carbon steel flanges. Metal bellows expansion joints shall have three factory installed tie rods to prevent excessive elongation, and to control the static pressure thrust at full rated working pressure of the connector. Tie rods shall utilize rubber grommets to limit vibration transfer.

C. Braided Metal Flexible Connectors: Corrugated 300 series stainless steel bellows (Type FCSS) or bronze bellows (Type FCB) flexible connectors with stainless steel or bronze braiding connected to braid collars and pipe fittings at each end.

D. Thermal and Seismic V-Connectors: Combination of two braided flexible connectors with stainless steel bellows and braids (Type SBS) or bronze bellows and braids (Type SBV), two 45° elbows and one 90° elbow configured in a V-shape layout for a total of 180° in pipe connection change. V-connectors shall allow movements as required by the application and of at least 2" (50 mm) along the 6 directions of XY, YZ and XZ planes. Large connectors shall be supplied with shipping bars tack welded at factory to maintain designed length before installation. For steam applications, a drain port and plug shall be specified and factory installed into the bottom of the 90° elbow to allow condensate to be drained.

E. Thermal Expansion Compensators: Type TEC – Thermal expansion compensators, constructed with two–ply series 300 stainless steel bellows and carbon steel shroud, internal liner and end fittings. Expansion compensators shall utilize anti-torque, anti-squirm devices and allow axial movements of 1-3/4" (44 mm) compression and 1/4" (6 mm) extension. In all applications, the compensator shall provide a minimum of 150% expected growth between anchors. Expansion compensator ends shall match piping connection methods.

F. Externally Pressurized Expansion Joints: Type XPEJ – Externally pressurized expansion joints, constructed using series 300 stainless steel formed bellows, external housing and pipe fittings. The externally pressurized expansion joints shall be rated to match the piping system and allow at least 4" (100 mm) of axial travel. Drain port and plug shall be provided factory installed where required.

2.6 ANCHORS AND GUIDES:

A. Spider Pipe Guides: Type SPG – Standard concentric spider type pipe alignment guides with heavy steel construction of sufficient strength to withstand lateral forces of at least 15% of calculated pipe anchor loads. Spider pipe guides shall provide space for specified insulation thickness and allow a minimum of 4" (100 mm) of axial movement (+/- 2" (50 mm)). For copper piping installations, dielectric spacers shall be furnished to prevent galvanic corrosion.

B. Pipe Riser Guides: Type PRG – Vertical sliding pipe riser alignment guides constructed with hollow structural shapes and welded steel plates and including rubber bushings between telescoping elements to eliminate metal-to-metal contact and minimize structure-borne noise transmission. Guides shall include support plates to accommodate attachment of pipe riser clamps or support brackets by welding or bolting. Guides shall be designed to be used in pairs with each associated pipe riser and accommodate vertical movement of at least 1-1/2" (38 mm) upwards or downwards from initial installed position.

C. Pipe Riser Anchors: Type PRA – All-directional pipe riser anchor resilient supports constructed with welded formed steel plate and including heavy duty rubber bushings to eliminate metal-to-metal contact and minimize structure-borne noise transmission. Anchors shall include support plates to accommodate attachment of pipe riser clamps or support brackets by welding or bolting. Anchors shall be designed to be used in pairs with each associated pipe riser and limit movement to less than 1/4" (6 mm) in any direction.

PART 3: EXECUTION

3.1 GENERAL:

A. Coordinate size, doweling, and reinforcing of concrete equipment housekeeping pads and piers with vibration isolation and restraint manufacturer to ensure adequate space and prevent edge breakout failures. Pads and piers must be adequately doweled in to structural slab.

B. Coordinate locations and sizes of structural supports for systems and equipment with locations of anchors, guides, stands, curbs, vibration isolators, and restraints.

C. Isolated and restrained equipment, duct, and piping located on roofs must be attached to the structure. Intermediate supports between the restraint points that are not attached to the structure must be coordinated with the restraint manufacturer.

D. Coordinate project material requirements with isolation and restraints supplier, e.g., use stainless steel components or hot-dipped galvanized products where required.

3.2 VIBRATION ISOLATION:

A. Block and shim all bases level so that all ductwork, piping, and electrical connections can be made to a rigid system at the proper operating level before isolators are adjusted. Ensure that there are no rigid connections or incidental physical contacts between isolated equipment and the building structure or nearby systems.

B. Select and locate vibration isolators to provide similar loading and deflection, according to weight distribution of equipment.

C. Secure base-mounted pumps and equipment, as indicated in this Section or on the drawings, to concrete-filled inertia bases. Concrete in-fill shall be supplied by the installing contractor on site.

D. Coordinate materials and connection styles for inline flexible connectors and expansion joints with isolation supplier, e.g., ANSI B16.5 Class 150 steel flanges for flanged pipe connections.

E. Types and Extent of Piping Isolation:

1. Isolate all piping larger than 1" (25 mm) nominal diameter rigidly connected to vibration isolated equipment with 1" (25 mm) static deflection spring isolators, except as described below, at spacing intervals in accordance with the following:

| Pipe Diameter | Distance from Vibrating Equipment |
|---|---|
| 1-1/4" to 4" | 50' |
| 6" and 8" | 60' |
| 10" and larger | 70' |

   a. Horizontal: Floor supports for piping shall incorporate restrained spring floor isolators appropriate for the applicable design forces. Suspended piping shall be supported with Type SHR isolators, or PSHR at contractor option. The first 3 isolators shall be selected with the same nominal static deflection as the equipment isolators, but no greater than a nominal 2" deflection. The remaining isolators shall be selected with a nominal 1" static deflection.

   b. Vertical: Piping shall be isolated from the supporting structure with spring floor isolators or spring and rubber isolator hangers selected with a nominal 1" static deflection.

2. Spring hanger isolators shall be cut in to the hanger rods and installed after the associated piping system is filled or other provisions must be made to ensure piping does not change height significantly during installation and start-up. Contractor may choose at their option to use pre-compressed spring hangers (i.e., Type PSHR) to enable installation prior to filling pipe systems.

3. Exemptions: Piping attached to isolated equipment with double sphere rubber expansion joints or flexible metal hose with minimum length equal to 10 pipe diameters, or to air handling units with internal vibration isolators meeting the requirements of these specifications is exempt from these requirements unless otherwise specified or indicated on the drawings.

F. Types and Extent of Ductwork Isolation:

1. Isolate all ductwork that is rigidly connected to isolated or vibrating equipment, including grease hood exhaust ductwork, for a minimum distance of 50' from the equipment. Ductwork attached to isolated or vibrating equipment with flexible connections or to air handling units with internal vibration isolators is exempt from these requirements.

   a. Suspended ductwork shall be supported with Type SHR isolators selected with a nominal 1" static deflection.

   b. Floor-supported ductwork shall be isolated from the structure with spring floor isolators selected with a nominal 1" static deflection.

G. Engine-generator set silencers and associated exhaust piping shall be supported with Type SHR isolators selected with a nominal 1" static deflection.

H. Equipment Isolation: See schedules on drawings.

I. Installing contractor shall ensure no rigid contact of isolated piping, ductwork, or equipment with other structure, building systems, or components such as shaft walls, floor slabs, partitions, or conduits.

J. Provide height-saving brackets (HSB) where specified for equipment stability or operating height requirements.

K. Where recommended by the manufacturer or required for restraint, floor mounted isolators shall be bolted to the supporting structure.

L. Provide spring-loaded thrust restraints for fans and any suspended equipment where movement due to fan operation under any operating condition will exceed 3/8".

M. Isolator hangers shall be installed with the housing a minimum of 1/4" below but as close to the structure as possible. Where isolator hangers would be concealed by non-accessible acoustical sub ceiling, install the hangers immediately below the sub ceiling for access.

3.3 SEISMIC/WIND RESTRAINTS:

A. General:

1. All equipment, piping and ductwork shall be restrained to resist seismic/wind forces as required by and in accordance with the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds or any other qualified fastening methods. Friction shall not be considered as positive attachment. All attachments shall be proven capable of accepting the required wind and seismic loads by testing or analysis.

2. Install seismic and wind restraints per the Delegated Design Engineer and manufacturer's submittals. Any deviation from the manufacturer's instructions shall be reviewed and approved by the manufacturer and the Delegated Design Engineer.

3. Attachment to structure for all restraints shall be as specified by the Delegated Design Engineer. Any changes or modifications shall be reviewed and approved by this engineer prior to installation or submission to the local authority.

4. Coordinate sizes and locations of cast-in-place inserts for attaching restraints to post-tensioned slabs with the restraint manufacturer and the Delegated Design Engineer.

5. Provide hanger rod stiffeners where indicated or as required by the Delegated Design Engineer to prevent buckling of threaded hanger rods due to uplift caused by design forces.

6. Where rigid restraints are used on equipment, ductwork, or piping components, the associated component support rods must be attached to structure with anchors rated for seismic use.

7. Install restraint cables so they do not bend across edges of adjacent components or building structure.

B. Concrete Anchors:

1. Follow all installation instructions and requirements as provided by anchor manufacturer. Use certified installers where required by anchor manufacturer.

2. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid any embedded items such as pre- or post-tensioned tendons, electrical and telecommunications conduit, and gas lines.

3. Do not drill holes in concrete or masonry for installing anchors until concrete, mortar, or grout has achieved full design strength.

4. Install rubber grommet washers on equipment anchor bolts or fill empty annular space with epoxy where clearance between anchors and equipment support holes exceeds 1/4" (6 mm).

5. Mechanical Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is fastened.

6. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

7. Set anchors to manufacturer's recommended torque, using a torque wrench.

C. Equipment Restraints:

1. Restrain equipment as required by the Delegated Design Engineer. Install fasteners, straps, restraints, and brackets as required to secure equipment.

2. Install snubbers on equipment supported by floor-mounted vibration isolators that are not rated for the applicable lateral design forces. Locate snubbers as close as possible to vibration isolators and attach to both equipment or its base and to supporting structure as required.

D. Duct Systems:

1. Where required, space transverse seismic restraints at a maximum of 30' o.c. and longitudinal restraints at a maximum of 60' o.c.

2. Where required, duct risers shall be restrained at floor penetrations every 30' maximum spacing.

3. Fire damper locations may be used as restraint locations for all directions except away from the damper, provided that both the damper frame and the wall can withstand the design loads.

4. Install flexible duct assemblies in duct runs that cross building seismic joints, sized for the anticipated amount of movement.

E. Piping Systems:

1. Restraint spacing where required:

a. For ductile piping, space transverse supports a maximum of 40' o.c.,and longitudinal supports a maximum of 80' o.c.

b. For non-ductile piping (e.g., cast iron, PVC) space transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.

c. For piping with hazardous material inside (e.g., natural gas, medical gas) space transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.

d. For vertical pipe risers, restrain the piping at floor penetrations using the same spacing requirements as above.

2. Longitudinal restraints for single pipe supports shall be attached directly to the pipe, not to the pipe hanger.

3. For supports with multiple pipes (e.g., trapezes), secure pipes to supporting member with clamps approved for application.

4. Piping on roller supports shall include a second roller support located on top of the pipe at each restraint location to provide vertical restraint. At the discretion of the Delegated Design Engineer, oversized U-bolts or other means may be used in lieu of a second roller.

5. Install thermal and seismic V-connectors in piping which crosses building seismic joints, sized for the anticipated amount of movement.

6. Install flexible piping connectors where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.

7. Coordinate restraints with thermal expansion compensators, guides and anchor points. Thermal expansion anchor points shall be designed to accommodate seismic forces.

3.4 INSPECTION AND CERTIFICATION:

A. After installation, arrange and pay for the vibration isolation product manufacturer, or representative, to visit the site to verify that the vibration isolation systems are installed and operating properly, and to submit a letter so stating. At a minimum, verify that isolators are properly adjusted, with springs perpendicular to bases or housing, adjustment bolts are tightened on equipment mountings, and hanger rods are not in contact with hanger isolator housings.

B. After installation, arrange and pay for the restraint product manufacturer, or representative and/or the Delegated Design Engineer or their representative to visit the site to verify that the restraint systems are installed properly, and to submit a letter so stating. The letter shall be sealed and signed by the Delegated Design Engineer.

C. Any deficiencies identified shall be corrected by the installing contractor until accepted by the Engineer of Record or Delegated Design Engineer as appropriate. Corrective work shall be in compliance with applicable building codes and this specification and construction documents or reasonable equivalent.

END OF SECTION 15242

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. All work covered in this section consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to the following systems, piping, equipment, and ductwork.

### 1.2 DEFINITIONS:

A. Exposed piping and ductwork is that which can be seen when the building is complete without opening or removing access door panels, or ceilings tiles. This also includes all mechanical equipment rooms and pipe tunnels.

B. Concealed piping and ductwork are those elements above ceilings, in chases, interstitial space and pipe spaces. Other piping and ductwork is considered to be exposed.

C. Exterior piping and ductwork is that which is exposed to the weather and/or outside the building envelope. Piping and ductwork protected by overhangs, areaways, etc., exterior to the building envelope are considered exterior.

D. ASJ: All service jacket, white finish facing or jacket.

E. Air conditioned space: Space directly supplied with heated or cooled air.

F. Cold: Equipment, ductwork or piping handling media at design temperature of 60 degrees F or below.

G. FRK: Foil reinforced kraft facing.

H. FSK: Foil-scrim-kraft facing.

I. Hot: Ductwork handling air at design temperature above 60 degrees F; equipment or piping handling media above 105 degrees F.

J. Pcf: Density, pounds per cubic foot.

K. Runout: Branch pipe connection up to one inch nominal size to a one terminal piece of equipment (fan coil, terminal box).

L. Thermal conductance: Heat flow rate through materials.

1. Flat surface: BTU per hour per square foot.

2. Pipe or cylinder: BTU per hour per linear foot.

3. Thermal conductivity (k): BTU per inch thickness, per hour, per square foot, per degree Fahrenheit temperature difference.

### 1.3 QUALITY ASSURANCE:

A. Products of the manufacturers, herein, will be acceptable for use for the specific functions

noted. All materials shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such materials in either the wet or dry state.

B. Materials shall be applied subject to their temperature limits. Any methods of application of insulation materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.

C. Insulation shall be applied by experienced workers regularly employed for this type work.

1.4 RATING:

A. All insulation shall have composite surface burning characteristic rating as tested by ASTM E 84, UL 723, or NFPA 255 not exceeding:

| | |
|---|---|
| Flame Spread | 25 |
| Smoke Developed | 50 |

B. Composite shall include insulation, jacketing and adhesive used to secure jacketing or facing. All accessory items such as PVC jacketing and fittings, adhesive, mastic, cement, tape and cloth shall have the same component rating as specified above.

1.5 STANDARDS:

A. ANSI/ASHRAE Standard 90.1 Energy Standard for Buildings Except Low-rise Residential Buildings.

B. Midwest Insulation Contractors Association "Commercial and Industrial Insulation Standards" - Third Edition.

1.6 SUBMITTALS:

A. Submittals shall include all materials used, including:

1. Insulation
2. Jacketing
3. Tapes
4. Hardware
5. Mastics
6. Adhesives

B. Submittals shall be formatted to include a list of materials for each service:

C. Submittals shall use pages from Midwest Insulation Contractors Association - "Commercial and Industrial Insulation Standards" for defining how insulation materials will be applied.

PART 2 - PRODUCTS

2.1 GLASS FIBER INSULATION:

A. Piping:

1. Nominal minimum thicknesses are listed in the table at the end of this section. These thicknesses are based on insulation having a thermal resistivity between 4.0 to 4.6 sq. ft.-hr.-F/BTU-in. on a flat surface resistivity to maintain equivalent insulation

value.

2. Insulation shall be 850 deg. F rated as manufactured by Owens Corning, Manville or Knauf.

3. Insulation shall have factory-applied, reinforced, flame retardant, vapor barrier jacket equal to Owens-Corning ASJ with selfsealing lap. Butt joints shall be taped with field-applied ASJ tape 3 in. wide.

4. Refer to the table at the end of this section for required pipe insulation thicknesses.

5. Routed or molded fitting insulation shall be Hamfab.

B. Ductwork (Insulation):

1. Insulation shall be 250 deg. F rated as manufactured by Owens Corning, Manville, Knauf, or Certainteed.

2. Duct Wrap: 1.0 PCF with aluminum or FRK facing, having a maximum vapor transmission of .02 perms.

2.2 ELASTOMERIC CLOSED CELL INSULATION:

A. Tubing and Sheet:

1. Flexible fire retardant closed cell, conforming to ASTM C 534, and ASTM 1056. Thermal resistivity shall be 3.70 sq.ft.-hr-F/BTU-in. Insulation shall be Rubatex or Armaflex.

2.3 FINISHES:

A. Metal jacketing, smooth .016 in. thick, type T 3003 aluminum with laminated moisture barrier. Jacketing shall be Childers, aluminum roll jacketing with Polykraft moisture barrier. Jacketing shall be embossed "No Asbestos" on a 6 inch spacing.

B. Metal fitting covers shall be two piece aluminum. Covers shall be Ell-Jac.

C. Foil scrim kraft (FSK) jacket, flame retardant vapor barrier. Jacket shall be Alpha Temp 10651, all service jacket.

D. Fitting covers shall be one piece 20 mil PVC, covers shall be Ceel-Tite 550 PVC-UVR by Ceel-Co. Zeston and Proto are approved equals.

E. Water based latex enamel equal to Armstrong WB Armaflex Finish.

2.4 MISCELLANEOUS:

A. Adhesives:

1. Glass & Mineral Fiber - Foster 85-20 / Vimasco 795.
2. Cellular Glass - Pittcote 300 / Childers CP-30.

B. Mastic (Weather Barrier):

1. Foster 35-00 Mastic / Vimasco.
2. Childers Vi-Cryl CP10/11.
3. Vimasco WC-5.

C. Coatings:

1. Foster - Monolar Coating / Vimasco
2. Foster Sealfas 30-36 / Vimasco
3. Foster Tite-Fit 30-56 / Vimasco
4. Pittcote 300

D. Vapor Barrier Sealant: Foster Flextra 95-50

E. FSK tape 3 in. wide, equal to Nashua FSK.

F. Insulpins

G. Roll on Corner bead (2 in. x 2 in., 26 ga. galvanized steel).

H. Fiber reinforced tape - Nashua 357, or 398.

I. Insulation protection shields - Grinnell fig 167.

J. Rigid insulation inserts - Hamfab.

K. Reinforcing Cloth - Vimasco, Elastafab 894, conforming to ASTM D1668.

L. Bands - .020 in., aluminum, ½ in. wide, embossed continuously with the legend "No Asbestos".

M. Hexagonal Wire Netting - One inch mesh, 22 ga. galvanized steel.

## PART 3 - EXECUTION

### 3.1 GENERAL:

A. Insulation shall be applied to clean and dry surfaces after tests and approvals required by this specification have been completed.

B. On cold surfaces where a vapor barrier must be maintained, insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

D. All pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.

E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required.

F. Size insulation to cover electric heat tracing on piping where it is specified.

G. All clevis type pipe supports shall be sized to fit the outside diameter of the insulation.

H. Insulate valves, fittings, flanges etc. with the same thickness of insulation as specified for piping.

I. Install longitudinal jacketing laps to shed rainwater.

J. Insulate items mounted in ductwork with the same thickness of insulation as specified for ductwork: including air measuring stations, smoke dampers, and automatic dampers.

K. Repair insulation damaged by work under this contract to match existing work or replace damaged portion with insulation specified for new work.

L. Standing seams and other projections in ductwork or casings shall have insulation applied so that at least ½" of insulation will cover such projections.

M. Where ductwork is lined, no thermal insulation is required.

N. Where unlined duct and lined duct connect, the insulation shall overlap lined section at least 6".

O. Piping and ductwork covered with metal or P.V.C. jacketing systems shall have the joints made to shed water. Laps shall be positioned in the bottom quadrant on horizontal pipe and ductwork.

3.2 HVAC SYSTEMS:

A. Concealed Ductwork:

1. Apply jacketed ductwrap to all concealed ductwork providing conditioned air, or outside air. Insulate return ductwork in non-conditioned spaces and in ceiling spaces below a roof.

2. Pull insulation snug, but do not compress insulation more than 1/4 inch.

3. Secure ductwrap insulation to ductwork using adhesive. Secure insulation on bottom on sides of horizontal ductwork and all sides of vertical ductwork with insulpins welded to duct on 12 to 18 inch centers and with clips slipped over the pins. Apply clips without compressing insulation. Make joints by lapping the facing a minimum of 2 inch and stapling with T-5 flared staples. Vapor - seal with Childers CP-30 Low Odor at all staples, clip locations and other penetrations. Seal joints with 3 inch wide FSK tape.

4. See schedule at end of this section for insulation thicknesses.

B. Elastomeric:

1. Apply closed cell elastomeric insulation to all pipes, equipment and surfaces listed below.

2. Secure insulation with contact adhesive in accordance with manufacturers instructions.

3. Insulate fittings and valves with miter cut pieces of insulation same thickness as piping.

4. DX Systems:

   a. Apply one layer of 1 inch thick elastomeric closed cell tubular insulation to the refrigerant suction line, and the refrigerant liquid line after the expansion valve.

5. Cooling coil condensate piping - 1 in. thick

6. Covers and caps for all valve stems and operators, gauge cocks, thermometer wells and other appurtenances subject to sweating.

C. Finishes:

1. Metal Jacketing (Aluminum):

   a. Cover the following insulated systems with metal jacketing:

      (1) Piping installed outdoors
      (2) Exposed piping indoors within 8 ft. of finished floor

   b. Cover with .016 in. thick aluminum jacket and hold in place with 2 in. wide aluminum bands on 9 in. centers. Fittings shall be covered with mitered segments of jackets or two piece preformed fitting covers. Provide angle ring escutcheons at wall, ceiling or floor penetrations.

   c. Machine cut the jacket to produce a straight, smooth edge. Lap longitudinal and circumferential seams not less than 2 in. Install jackets on horizontal piping with the longitudinal seam approximately midway between horizontal centerline and the bottom side of pipe. Install with the top edge of jacket overlapping the bottom edge of jacket and with the seam of each jacket slightly offset from the seam of the adjacent jacket. Install jackets on vertical piping and on piping pitched from the horizontal from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it.

2. Metal Jacketing (Galvanized):

   a. Insulated ductwork installed outdoors, insulated ductwork within 8 ft. of the finished floor in a mechanical room shall be covered with 30 gauge galvanized steel. Covering shall be hemmed, and flanged. Secure with self tapping screws on eight inch centers. Do not puncture vapor barrier.

3. All Service Jacket/fitting Covers:

   a. Exposed piping finish covering indoors shall be the All Service Jacket. Fittings shall be covered with molded fitting covers.

   b. Concealed Piping finish covering shall be the All Service Jacket. Fittings shall be covered by wrapping the fitting with fiber reinforced tape, with a 5 percent overlap.

c. Pipe fittings larger than cataloged aluminum two piece or PVC covers shall be covered with vapor barriers mastic for cold lines, or two layers of hydraulic cement reinforced with wire mesh and finished with vinyl acrylic weather barrier mastic.

4. Paint:

a. Exposed or exterior installations of elastomeric closed cell insulation shall be painted with two coats of water base latex enamel.

3.3 PLUMBING SYSTEMS:

A. Domestic Water Piping:

1. See schedule at the end of the section for thickness.

2. Each section of insulation shall be firmly butted and secured with ASJ or SSL butt strips a minimum 3 inches wide. ASJ jacket laps and butt strips shall be secured with outward clinch staples at 4 inch spacing (hot piping only).

3. All fittings and valves shall be insulated with preformed fiber glass fittings or mitered sections of pipe insulation. Insulation shall be of equal thickness to the adjacent pipe insulation.

4. Insulate flanges and unions ![on electric traced piping] with insulation of same thickness as specified for pipe connected to flanges. Do not insulate flanges and unions or low temperature (below 120 deg. F) water systems.

5. Provide rigid insulation inserts per manufacturer's recommendations at each support.

6. Provide insulation shield at each support.

7. Provide removable insulation sections equal in thickness to pipe covering.

B. Cold Piping (Cellular Glass Only):

1. Insulate horizontal rain leaders (normal and emergency) in ceiling plenums.

2. Thickness:

a. All sizes - 1-1/2 inch thick.

3. The insulation shall be applied with all joints buttered full depth with mastic or joint sealant. The insulation sections shall be staggered and tightly butted together, except at contraction joints. Use ½" x 0.015" aluminum bands 12" on center. The mastic or joint sealant shall be white in color.

4. Insulation for fittings, valves, and flanges shall be sized to match adjacent straight run pipe insulation and fabricated from cellular glass. All joints shall be sealed as above. Large voids between the insulation and fitting shall be filled with a polyurethane foam.

5. Insulation shall be covered with field or factory applied All Service Jackets. Overlap

on the longitudinal seams shall be sealed with vapor seal adhesive and stapled. Overlap jacket along pipe length and seal with adhesive.

6. Provide at each support a curved insulation protection shield.

7. Cover each staple with vapor seal mastic.

C. Elastomeric:

1. Apply closed cell elastomeric insulation to all pipes, equipment and surfaces listed below.

2. Secure insulation with contact adhesive in accordance with manufacturers instructions.

3. Insulate fittings and valves with miter cut pieces of insulation same thickness as piping.

4. Insulated surfaces:

a. Waste piping from electric cooler - 1 in. thick.

b. Cooling coil condensate piping - 1 in. thick.

c. Covers and caps for all valve stems and operators, gauge cocks, thermometer wells and other appurtenances subject to sweating.

D. Finishes:

1. All Service Jacket/fitting Covers:

a. Exposed insulated piping indoors not scheduled for painting shall be covered with an All Service Jacket. Fittings shall be covered with molded fitting covers.

b. Concealed Piping finish covering shall be the All Service Jacket. Fittings shall be covered by wrapping the fitting with fiber reinforced tape, with a 5 percent overlap.

c. Pipe fittings larger than cataloged aluminum two piece or PVC covers shall be covered with vapor barrier mastic for cold lines for hot lines, or two layers of hydraulic cement reinforced with wire mesh and finished with vinyl acrylic weather barrier mastic shall be used.

2. Metal Jacketing (Aluminum):

a. Cover the following insulated systems with metal jacketing:

(1) Piping installed outdoors
(2) Exposed piping indoors within 8 ft. of finished floor

b. Cover with .016 in. thick aluminum jacket and hold in place with 2 in. wide aluminum bands on 9 in. centers. Fittings shall be covered with mitered segments of jackets or two piece preformed fitting covers. Provide angle

ring escutcheons at wall, ceiling or floor penetrations.

c. Machine cut the jacket to produce a straight, smooth edge. Lap longitudinal and circumferential seams not less than 2 in. Install jackets on horizontal piping with the longitudinal seam approximately midway between horizontal centerline and the bottom side of pipe. Install with the top edge of jacket overlapping the bottom edge of jacket and with the seam of each jacket slightly offset from the seam of the adjacent jacket. Install jackets on vertical piping and on piping pitched from the horizontal from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it.

3. Paint:

a. Exposed or exterior installations of elastomeric closed cell insulation shall be painted with two coats of water base latex enamel.

| MINIMUM DUCT INSULATION REQUIREMENTS | | | | |
|---|---|---|---|---|
| | EXTERIOR | ATTIC | UNCONDITIONED SPACES | INSIDE CONDITIONED SPACES |
| **SUPPLY DUCT** | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| RETURN DUCT | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| OUTSIDE AIR | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| EXHAUST DUCT | | | | |
| Duct wrap | -- | R-8 | R-8 | -- |

| Domestic Water Piping | | |
|---|---|---|
| Insulation Thickness for Pipe Sizes (Fiberglass) | | |
| Temperatures °F | Up to 1 1/4 in. (In.) | 1-1/2 in and Larger (in.) |
| Cold Water | 0.5 | 1.0 |

| | | |
|---|---|---|
| 105-140 | 1.0 | 1.5 |

END OF SECTION 15260

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. The work required under this section includes all work necessary for a complete installation of air cooled heat pump units.

### 1.2 SUBMITTALS:

A. Shop drawings shall include complete manufacturer's data on the following:

1. Unit capacity
2. Dimensions
3. Power Requirements
4. Connections
5. Sound Power Level
6. Control & Wiring Diagrams

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Units shall be assembled on minimum 10 gauge steel mounting/lifting rails and shall be weather proofed. Unit shall include hermetic compressor(s), plate fin condenser coil, fans and motors, controls and holding charge of refrigerant. Operating Range shall be between 115 degrees F and 35 degrees F in cooling as standard from factory. Units shall be UL listed, and rated in accordance with ARI Standard 240 and 270.

### 2.2 CASING:

A. Unit casing shall be constructed of minimum 18 gauge G-210, heavy galvanized steel. Exterior surfaces shall be cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Coating system shall have been tested 500 hours in salt spray test (ASTM B117). Units shall have removable panels which allow access to all major components and controls.

### 2.3 REFRIGERATION SYSTEM:

A. Compressor shall be scroll type, hermetically sealed and mounted on rubber vibration isolators. Compressor shall include internal over temperature and pressure protection, thermostatically controlled sump heater, and internal spring mounts.

B. Units shall have a single refrigeration circuit. Circuit shall include factory installed liquid line drier, low pressure switch. Liquid line and suction line service valve with gauge port.

### 2.4 HEAT PUMP COIL:

A. Coils shall be internally finned or smooth bore 3/8 inch copper tubes mechanically bonded to configured aluminum plate fin as standard.

B. Heat pump coil shall be leak tested to 150 PSIG, pressure tested to 450 PSIG, and qualified

to UL 1995 burst tested at 1775 PSIG.

2.5 HEAT PUMP FAN AND MOTOR(S):

A. Units shall have direct-drive, statically and dynamically balanced fan(s) with aluminum blades and electro-coated steel hubs shall be mounted in draw-through vertical discharge position. Permanently lubricated totally enclosed type motors shall be provided and shall have built in current and thermal overload protection. Heat pump fan discharge shall include safety guards.

2.6 CONTROLS:

A. Units shall be completely factory wired with necessary controls and contactor with pressure lugs or terminal block for power wiring. Control wiring shall be 24-volt control circuit which includes fusing and control transformer.

2.7 DEFROST CONTROLS:

A. Electronic timed initiated, temperature terminated defrost system with choice of 50, 70, or 90 minute cycle. Timed override limits defrost cycle to 10 minutes.

2.8 LOW AMBIENT HEAD PRESSURE:

A. Modulate the RPM of unit outdoor fan motor in response to outdoor ambient temperatures and unit head pressure. Provides unit cooling operation to outdoor temperature 0 degrees F.

2.9 TIME DELAY RELAY:

A. Prevent compressors in dual compressor unit from coming on line simultaneously. Timer shall be 24-volt, 60 cycle, with four minutes timing period.

2.10 ANTI-SHORT-CYCLE TIMER:

A. Prevent rapid on-off compressor cycling in light load conditions by not allowing compressor to operate for 5-7 minutes upon shutdown. Timer shall consist of a solid state timing device, 24-volt, 60 cycle with either 5 or 7 minute fixed-off timing period.

2.11 HEAT PUMP COIL GUARD:

A. Metal grille with PVC coating shall be provided to alleviate coil damage.

2.12 WARRANTY:

A. Provide a written warranty agreeing to replace components that fail in materials and workmanship within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

B. Warranty Period: Manufacturers standard, but not less than five (5) years from date of Substantial Completion for compressor(s) and one (1) year for all other components.

2.13 ACCEPTABLE MANUFACTURERS:

A. Trane, Carrier, JCI/York, Bryant, Lennox, Daikin or prior approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install heat pump units according to manufacturers written instructions.

B. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

C. Install ground-mounted units on concrete housekeeping pad 4 inches larger than condensing unit on each side. Anchor unit to pad.

D. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories. Provide refrigerant accessories shown on the drawings.

E. Route control wiring in conduit.

F. Provide sleeves for piping and conduit through walls. Seal wall penetrations.

3.2 TESTING:

A. After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks and replace lost refrigerant oil. Use electronic leak detector to test for leakage.

B. After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements. Record suction pressure.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units with new units and retest.

3.3 MISCELLANEOUS:

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Clean units to remove dirt and construction debris and repair damaged finishes.

B. Insulate suction piping. Paint insulation that is not covered by aluminum jacket.

END OF SECTION 15671

SECTION 15853 - HEAT PUMP UNIT - INDOOR SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. The work required under this section includes all work necessary for a complete installation of indoor heat pump unit.

1.2 COORDINATION:

A. The air handling units of one manufacturer have been used as the basis of design. Any modifications to ductwork, piping, wiring, or building structure, that results from the use of any other units shall be coordinated with all trades prior to delivery of approved equipment from the manufacturer.

1.3 CODES AND STANDARDS:

| | | |
|---|---|---|
| A. | NFPA 90A | Installation of Air conditioning and Ventilation Systems. |
| B. | ANSI/AFBMA 9 | Load Ratings and Fatigue Life for Ball Bearings. |
| C. | SMACNA | HVAC Duct Construction Standards. |
| D. | ARI 410 | Standard for Forced Circulation Air-cooling and Air-Heating Coils. |
| E. | ANSI/UL 900 | Test Performance of Air Filter Units. |
| F. | AMCA 301 | Method for Publishing Sound Ratings for Air Moving Devices. |
| G. | NFPA 70 | National Electrical Code |
| H. | UL 1995 | Heating and Cooling Equipment |

1.4 SUBMITTALS:

A. Submittals shall include the following:

1. Unit Housing:

   a. Certified dimensional drawings
   b. Casing Construction
   c. Insulation

2. Fan:

   a. Fan curves
   b. RPM
   c. Brake horsepower

3. Motor

a. Manufacturers data sheet

4. Coils

a. Manufacturers data sheet
b. Coil selection input/output using an ARI-410 certified selection program

5. Filter

a. Manufacturers data sheet
b. Filter frame size and quantity of filters

6. Sound Power Level

a. Octave band reference $10^{-12}$ watt
b. Inlet and outlet

1.5 ACCEPTABLE MANUFACTURERS:

A. Carrier, Trane, JCI/York, Bryant, Lennox, Daikin, or prior approved equals.

PART 2 - PRODUCTS:

2.1 EQUIPMENT:

A. General:

1. Provide factory assembled, blower coil air handler. Unit shall be shipped as one piece except as specified herein. Unit consists of a fan and coil section with factory-installed direct expansion coil, reheat coil, heating coil, filter rack, and mixing box.

B. Casing:

1. Units shall be fabricated of heavy gauge galvanized steel with a minimum G 90 zinc coating, able to withstand a 1000 hour salt spray test per ASTM B-117.

2. Insulation shall be 1 inch, 4 pound per cubic foot dual density scrim reinforced foil faced insulation, glued and pinned with mechanical fasteners. Minimum thermal conductivity shall be 0.23.

3. Insulation must comply with UL 181, ASTM-C1071, NFPA 90A & 90B and meets bacteriological standard ASTM-C665 and C1136 for mold, mildew and humidity resistance.

4. Provide 1" duct collars on discharge and return openings.

5. Access panels shall be fully insulated and attached with standard lift and turn fasteners on at least two opposite sides. No coil or drain piping or electrical connections shall pass through any access panel.

C. Fan/Motor/Drive:

1. Units shall be furnished with SWSI forward curved centrifugal blowers statically and

dynamically balanced for smooth operation. All blower wheels shall be mounted on solid steel shafting rotating in ball bearings with a minimum design average life of 100,000 hours. All blower assemblies shall have resilient mounted cartridge type permanently lubricated ball bearings.

2. All fan motors shall be standard NEMA design motors of the horsepower listed in the equipment schedule. Motors shall be mounted on an adjustable base. All motor wiring shall be terminated in a junction box, external to the unit casing.

3. All fan drive assemblies shall include an adjustable pitch motor pulley, a fixed pitch blower pulley and a standard cross section "V-belt". All fan drives shall be selected at a minimum service factor of 1.2.

D. Coils:

1. Direct-expansion coils shall be aluminum plate fins with belled collars and bonded to 1/2-in. O.D. copper tubes by mechanical expansion. Coils shall be provided with pressure-type brass distributors with solder-type connections. Coils for full face active or face split operation shall have intertwined circuits for equal loading on each circuit. Suction and discharge connections shall be on the same end. Coils shall be designed and tested in accordance with American National Standards Safety Code for Mechanical Refrigeration (ANSI/ASHRAE 15).

2. Electric heat coils for use in large air-handling units shall be open wire type, 80% nickel, 20% chromium resistance coils, insulated by floating ceramic bushings and supported in a galvanized steel frame. Bushings shall be recessed into embossed openings and stacked into supporting brackets spaced on not more than 4-in. centers. Thermal cutouts for primary and secondary over-temperature protection shall be provided to meet UL and NEC requirements. Maximum element heating density shall be 55 Watts/sq inch. An integral control box shall be furnished by the manufacturer. It shall contain thermal cutouts, primary and secondary control, sub-circuit fusing, airflow switch and fused control transformer.

3. All water and refrigerant coils shall be factory leak tested at 450 psig air pressure.

E. Condensate Drain Pans:

1. Drain pans shall be insulated G90 galvanized construction. The pan shall be sloped toward the drain fitting. Drain pan shall allow no standing water and comply with ASHRAE Standard 62.

F. Filter Sections:

1. Unit shall be furnished with a McDaniel Metals Labor Saver or equal. One complete set of spare pleated filters shall be provided for each unit.

G. Controls:

1. The unit fan motor shall be completely factory wired to an external electrical enclosure. Each unit shall include fan motor operating control with 24-volt control voltage. Each unit shall include motor circuit fusing, control circuit transformer with primary and secondary fusing and terminal strip for connection of field wiring.

2. A main incoming power non-fused disconnect switch shall be factory furnished and

wired by the unit manufacturer for single point power connection.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of refrigerant and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

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

B. Install floor mounted units on concrete housekeeping pads.

C. Arrange installation of units to provide access space around air-handling units for service and maintenance.

D. Install piping adjacent to machine to allow service and maintenance.

E. Connect condensate piping to drain pans. Extend to nearest floor drain. Drain line shall be installed with a slope of not less than 1/8 inch per foot down in the direction of flow.

F. Connect to supply and return coil tappings with shutoff or balancing valve and union or flange at each connection. Refer to details shown on drawings.

G. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connections.

H. Comply with applicable requirements in Division 16 Sections for power wiring, switches, and motor controls.

I. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.

J. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

K. Clean air handling units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face. Comb coil fins as required.

L. After completing system installation and testing, adjusting, and balancing, clean filter housings and install new filters.

END OF SECTION 15853

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the requirements for labor and materials necessary for the installation of power ventilators included as part of the building mechanical system.

### 1.2 SUBMITTALS:

A. Submit catalogue literature pertaining to the power ventilator listed within his Section to Architect/Engineer for approval.

B. Submittals shall include the following:

1. Dimensional information
2. Electrical connection and motor data
3. List of accessories or auxiliary items
4. Roof curb details and dimensions
5. Sound power levels at the mid frequency of each band.

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Power ventilators which are scheduled or referred to by model number or catalogue number are intended to include all materials covered by such number. Any required accessories for the installation of the fan are to be by the same manufacturer unless otherwise noted.

B. All wiring and electrical components shall comply with the National Electric Codes (NEC). All materials shall be U.L. Listed.

C. Fans shall be listed by Underwriters Laboratories (UL 705).

D. Fans shall bear the AMCA certified ratings seal for sound and air performance.

E. Fan assembly shall bear an engraved aluminum nameplate.

F. Each unit shall have a birdscreen constructed of galvanized wire mesh with ½ in. openings mounted vertically in the unit discharge. The birdscreen shall produce minimal effect on air and sound performance.

G. Roof Curbs:

1. Curbs shall be constructed using minimum 14 gauge galvanized steel with fully mitered and welded corners, integral base plates internally reinforced with 1 in. x l in. x 1/8 in. steel angle, factory insulated with l l/2 in. thick three pound per cu. ft. density fiberglass insulation. Curbs shall be fabricated without cants.

2. Minimum height of curb shall be 8 in. above finished roof. Curbs shall be constructed to match slope of roof and provide a level top surface for mounting of mechanical equipment.

### 2.2 INLINE CABINET EXHAUST FAN - DIRECT DRIVE:

A. Fan shall be inline mounted, direct driven, centrifugal exhaust fan.

B. GN 200-900 Series:

1. The fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated.

2. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on rubber-in-shear vibration isolators. Unit shall be supplied with integral wiring box and receptacle.

3. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings.

4. Wheel shall be centrifugal forward curved type, constructed of galvanized steel.

5. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

C. Motor shall be open drip proof type with permanently lubricated sealed bearings and include impedance or thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage and phase.

D. Fan shall be model GN as manufactured by Loren Cook Company. Greenheck, Acme and Penn Ventilator are approved equal.

2.3 CEILING MOUNTED EXHAUST FAN - DIRECT DRIVE:

A. Fan shall be ceiling mounted, direct driven, centrifugal exhaust fan.

B. GC 100 Series:

1. The fan wheel housing and integral outlet duct shall be injection molded from a specially engineered resin exceeding UL requirements for smoke and heat generation.

2. The outlet duct shall have provision for an aluminum backdraft damper with continuous aluminum hinge rod.

3. The inlet box shall be minimum 22 gauge galvanized steel.

4. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet. A field wiring compartment with receptacle shall be standard.

5. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided. A white, non-yellowing, high impact styrene injection molded grill shall be provided as standard.

6. Wheel shall be centrifugal forward curved type, injection molded of polypropylene resin. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

C. Motor shall be open drip proof type with permanently lubricated sealed bearings and include impedance or thermal overload protection and disconnect plug. Motor shall be furnished at

the specified voltage.

D. Fan shall be model GC as manufactured by Loren Cook Company. Greenheck, Acme and Penn Ventilator are approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install fan in accordance with manufacturer's installation instructions.

B. Install fans with clearances for service and maintenance.

C. Make final duct connections to fans with flexible connectors.

D. Curbs shall be installed in strict accordance with manufacturer's instructions and as detailed on the drawings.

E. Isolate fans from structure using vibration isolation hardware specified.

END OF SECTION 15870

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the filter elements and accessories necessary for a complete installation.

### 1.2 CODES AND STANDARDS:

A. NFPA 90A Installation of Air Conditioning and Ventilating Systems

B. NFPA 90B Warm Air Heating and Air Conditioning Systems

C. ASHRAE 52.1 Gravametric and Dust-Spot procedures for testing air-cleaning devices.

D. ASHRAE 52.2 Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size.

### 1.3 SUBMITTALS:

A. Submittals shall include manufacturer's literature and UL listing information.

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Air filters shall be Camfil Farr Company, American Air Filter, Flanders Filters, or approved equal.

B. Filters shall have the efficiencies indicated based upon the ASHRAE Standard 52.1 and ASHRAE Standard 52.2.

C. Complete filters shall be Underwriters Laboratories approved, Class II.

D. Prior to submission of drawings for filters, Contractor shall verify the size and number of filter cells for each air handling device.

E. Filter thicknesses shall be specified as below and as noted in HVAC equipment specifications.

F. Media support grid shall be welded wire on 1" centers with an open area of not less that 96%. Grid shall be bonded to the media to eliminate oscillation and pull away. The grid shall be formed to effect a radial pleat, allowing total use of media.

G. Enclosing frame shall be a rigid, high wet-strength beverage board, with diagonal support members bonded to the air entering and air exiting side of each pleat. The enclosing frame shall be chemically bonded to the filter pack.

### 2.2 PLEATED FILTERS:

A. MERV 8, 35% Efficient Filters:

1. Pleated air filters shall have an average efficiency of 35%, average arrestance of 95%, and MERV 8 in accordance with ASHRAE Standard 52.1 and 52.2. Filter shall be Camfil Farr 30/30 or approved equal.

2. 2 inch filter face area shall contain not less than 15 pleats per linear foot. Initial resistance at 500 fpm shall not exceed .28" w.g.

2.3 HOUSINGS:

A. Provide prefabricated plenum filter housing. Housing shall be suitable for direct mounting of air handling units. Housing shall be constructed of galvanized steel and lined with 1 inch insulation.

B. Housing shall include angled filter rack. Refer to equipment specifications or schedule for filter thickness.

C. Housing shall be McDaniel Metals "Labor Saver" or equal.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Provide air filters as noted in equipment specifications and in accordance with the schedule indicated on drawings.

B. For each filter bank, furnish and install F.W. Dwyer Manufacturing Co., or approved equal, differential pressure gauges with all accessories. Gauges shall be series 2000 Magnehelic. Draft gauges shall be located on the outside of the casing or filter housing in a convenient location.

C. Interconnecting wiring for power and controls shall be by this Contractor.

D. Two complete sets of spare filters shall be supplied for use during the construction and testing and balancing period.

3.2 HOUSINGS:

A. Install air handling unit on filter housing. Anchor and seal unit to housing.

B. Install housing, ductwork, and piping so that filter access door is not obstructed.

C. Install housing on 3/8 inch neoprene vibration isolation pads.

END OF SECTION 15886

SECTION 15887 - AIR PURIFICATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.

1.2 REFERENCED CODES & STANDARDS

A. The following codes and standards are referenced through out. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.

1. ASHRAE Standards 62 & 52

2. National Electric Code NFPA 70

3. UL 867 including ozone chamber test

1.3 QUALITY ASSURANCE

A. Basis of design is Global Plasma Solutions. American Ion shall be considered equal subject to meeting all specifications herein. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2.

B. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.

C. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable. "Hard" ionization is not equal to the "Soft" ionization of the basis of design.

D. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations.

E. The Air Purification System shall have been tested by UL or Intertek/ETL to prove conformance to UL 867 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers shall submit their independent UL 867 test data with ozone results to the engineer during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.

F. The maximum allowable ozone concentration per the UL 867 chamber test shall be 0.007 PPM. The maximum peak ozone concentration per the UL 867 peak test as measured 2 inches away from the electronic air cleaner's output shall be no more than 0.0042 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for ion generators including:

1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.

2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.

3. Performance data for each type of plasma device furnished.

4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled.

5. Product drawings detailing all physical, electrical and control requirements.

6. Copy of UL 867 independent ozone test.

B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.

B. Store in original cartons and protect from weather and construction work traffic.

C. Store indoors and in accordance with the manufacturers' recommendation for storage.

1.6 WARRANTY

A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of eighteen months after shipment or twelve months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

PART 2 - PRODUCTS

2.1 GENERAL:

A. The air purification systems shall be of the size, type, arrangement and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.

B. Basis of Design: Global Plasma Solutions

C. All other Suppliers of comparable products requesting prior approval shall:

1. Submit for prior approval in accordance with the requirements of Section 15015.

2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2007 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application shall also be included.

3. Submit independent test data from ETL or UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA

A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.

B. The Bi-polar Ionization system shall be capable of:

1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).

2. Controlling gas phase contaminants generated from human occupants, building structure and furnishings.

3. Capable of reducing static space charges.

4. Increasing the interior ion levels, both positive and negative, to a minimum of 800 ions/cm$^3$ measured 5 feet from the floor.

5. Self-cleaning requiring no maintenance or replacement parts.

6. Producing a minimum of 200M ions/cc.

C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable.

1. Air exchange rates may vary through the full operating range of a constant volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.

2. Velocity Profile: The air purification device shall not have maximum velocity profile.

D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.

E. Equipment Requirements:

1. Each Plasma Generator with Bi-polar Ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity. A minimum of one electrode pair per 4,800 CFM of air flow shall be provided. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, performance output reduction over time, ozone production and corrosion.

2. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating. Electrodes shall be made from carbon fiber to prevent oxidation over time. Internal circuitry shall be provided to sense air flow across the electrode output. Ionization systems requiring the use of a mechanical air pressure switch to cycle the electrodes only when the fan is operating shall not be acceptable due to high failure rates and pressure sensitivity.

3. Electrode pair shall provide a minimum of 200 million ions per cubic centimeter as measured at 2 inches, both positive and negative ions, in equal quantities. Devices providing less than 200 million ions/cc per electrode pair shall not be acceptable.

4. Each Plasma Generator shall be provided with a self-cleaning system that is field programmable to change the number of days between the cleaning cycle. Systems without a no-maintenance, self-cleaning system shall not be acceptable.

5. Each electrode pair shall be designed with a banana style plug such that it can be field replaced if necessary.

6. Each Plasma Generator shall be provided with an inline on/off switch, universal voltage input (24VAC to 240VAC or DC), magnets for mounting to the fan inlet, replaceable carbon fiber emitters and a programmable self-cleaning system.

F. Air Handler & Plenum Mounted Units:

1. Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with a molded casing, self-cleaning system, self-cleaning test button, power status LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per AHU is required to interface to the BAS or the optional DDC controller. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable. Manufacturers providing multiple ion modules that have alarm status wired in parallel, and not in series, shall not be acceptable.

G. Ionization Requirements:

1. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.

a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and integral power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed. The device shall be capable of being powered by 24VAC to 240VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.

b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.

c. Ionization output from each electrode shall be a minimum of 200 million ions/cc when tested at 2" from the ionization generator.

d. All manufacturers shall provide documentation by an independent NELAC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:

(1) MRSA - >96% in 30 minutes or less
(2) E.coli - > 99% in 15 minutes or less
(3) TB - > 69% in 60 minutes or less
(4) C. diff - >86% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELEC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable.

2. Ozone Generation:

a. The operation of the electrodes or Bi-polar ionization units shall conform to UL 867 with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.

H. Electrical Requirements:

1. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 24VAC to 240VAC, universal 2 wire input, 1 phase, 50/60 Hz. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

I. Control Requirements:

1. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset circuit breakers. Systems with manual fuses shall not be allowed.

2. Integral airflow sensing shall modulate the Plasma output as the airflow varies or stops. A mechanical airflow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.

3. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown or the plans. The contractor shall follow all manufacturer IOM instructions during installation.

4. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.

## PART 3 - EXECUTION

### 3.1 GENERAL:

A. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.

B. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.

C. All equipment shall be protected from dust and damage on a daily basis throughout construction.

### 3.2 TESTING

A. Provide the manufacturers recommended electrical tests.

### 3.3 COMMISSIONING & TRAINING

A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION 15887

SECTION 15892 - LOW PRESSURE DUCTWORK

PART 1 - GENERAL

1.1 SCOPE OF WORK:

A. The work required under this section includes all work necessary for a complete installation of ductwork and accessories.

1.2 CODES AND STANDARDS:

A. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. HVAC Duct Construction Standards: Metal and Flexible
2. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems
3. HVAC Air Duct Leakage Test Manual

B. National Fire Protection Association (NFPA):

1. 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
2. 90B - Standard for the Installation of Warm Air Heating and Air Conditioning System
3. 101 - Life Safety Code

C. American Society of Heating, Refrigerating and Air Conditioning Engineering (ASHRAE):

1. Fundamentals Handbook
2. Equipment Handbook

1.3 SUBMITTALS:

A. Submittals (for each duct system) shall include the following:

1. Sheet Metal:

a. Gages by sizes
b. ASTM Standards

2. Duct Fabrication Standards and Reinforcement:

a. Joint construction
b. Fitting construction
c. Joint and reinforcement spacing
d. Splitter damper and duct tap details
e. Flange details

3. Hangers:

a. Rods - sizes by duct
b. Straps
c. Trapeze
d. Spacing

4. Duct sealers

5. Flexible connectors

6. Flexible ductwork

7. Dampers:

   a. Factory fabricated
   b. Damper hardware

8. Access doors

9. 1/4-inch scale shop drawings indicating location and mounting height of duct.

B. Submittals shall include testing or listing certification, dimensional data and manufacturers literature on all manufactured products.

PART 2 - PRODUCTS

2.1 GENERAL:

A. Ductwork shall be fabricated from sheet metal products conforming to the following material standards:

1. Galvanized Steel - ASTM A653 (G60)

B. Duct system shall be fabricated with sheet metal thicknesses and reinforced in accordance with SMACNA as shown on the drawings and as described herein.

C. Unless noted otherwise the minimum pressure/velocity classification shall be 2 inch W.G. plus or minus, at 2500 ft. per minute, duct seal class "A".

D. Ducts 18 inches and larger on any side shall be stiffened by beading on not to exceed 12 inch centers.

E. All longitudinal seams shall be grooved, double or Pittsburgh type (except on watertight ducts or on heavy gauge ducts).

F. Branch connections in supply ducts shall be fabricated per the following schedule:

| Maximum Branch Size | Branch Connection |
|---|---|
| Up to, Rectangular equivalent to 12 inch round | 45 deg. tap collar with volume damper in branch |
| All other duct branches | Proportioned duct, with adjustable splitter damper |

G. Branch connections in return or exhaust ductwork shall be made with 45 degree entry fittings. If ducts are the same depth use parallel branch connection.

H. Where acoustical or thermal insulation is applied on the inside of ductwork, size of ductwork shall be increased so that the duct size shown on the drawings are the dimensions of the inside of the insulation.

2.2 GALVANIZED STEEL DUCTWORK:

A. Exposed galvanized steel duct work shall be surface treated for painting.

2.3 FITTINGS:

A. All junctions, bends, turns or elbows in all ducts or risers shall have a large radius (centerline radius equal to 1-½ times duct width) in the throat in order to minimize the frictional resistance.

B. Vanes shall be provided in elbows with 90 degree throats and throat radii less than 1-½ times duct width, and shall be located in accordance with ASHRAE standards. Double-vane airfoil-type turning vanes shall be provided for all square turns.

2.4 HANGERS AND SUPPORTS:

A. Building Attachments: Concrete inserts or structural steel fasteners appropriate for building materials.

B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.

1. Hangers installed in non-conditioned spaces and outdoors: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.

2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A36.

1. Supports for Galvanized Steel Ducts: Galvanized steel shapes and plates.

2.5 SEALANT MATERIAL:

A. Duct Sealer: Solvent or water based type U.L. classified meeting NFPA 90A Class 1 with zero fire and smoke development rating. Sealer shall be United Sheet Metal, United Duct Sealer, or Hardcast Iron Grip No. 601.

2.6 FLEXIBLE CONNECTORS:

A. Flexible connectors shall be U.L. listed, neoprene coated heavy glass fabric. Fabric shall be Ventglas, manufactured by Ventfabrics, Inc.

2.7 FLEXIBLE DUCTWORK:

A. Flexible duct shall be UL listed and labeled as Class 1, Air Duct Connector, in accordance with U.L. Standard 181 and shall meet the requirements of the latest NFPA Bulletin, No. 90A and No. 90B for flame spread and smoke development rating.

B. Flexible duct shall be rated for a maximum pressure of 6 inch positive and 5 inch negative and 5500 fpm maximum velocity. Air duct shall consist of: CPE liner, coated spring steel wire helix, fiberglass insulating blanket, fiberglass scrim and reinforced aluminum vapor barrier. Insulation valve shall be a minimum or R-6. Edges of liner shall be protected by sheet-metal noisings.

C. Duct shall be Flexmaster Type 8M or prior approved equal.

2.8 DAMPERS:

A. Single Blade Dampers:

1. Single Blade Dampers shall be constructed of 22 gauge galvanized steel (blade and frame). Single blade dampers shall be limited to a 12 inch high blade. Blade edges shall be crimped or reinforced. Damper levers shall indicate positively the open and closed position. End bearings shall be molded synthetic. Dampers shall be Ruskin MD25 or approved equal (Ruskin MDRS25 for round ducts).

B. Multiblade Dampers:

1. Multiblade dampers shall be constructed of sheet metal the same material as the adjacent ductwork. Damper frame shall be not less than 16 ga., damper blades not wider than 6 inches crimped or reinforced. Damper levers shall indicate positively the open and closed position. End bearings shall be molded synthetic. Damper shall be Ruskin MD35 or approved equal.

C. Acceptable Manufacturers:

1. Ruskin, Greenheck, Air Balance or prior approved equal.

2.9 DAMPER HARDWARE:

A. All hardware shall be SMACNA accepted.

B. Insulated ductwork (concealed) - Ventlok 639 elevated dial regulator.

C. Insulated ductwork (exposed) - Ventlok 644 - self locking regulator.

D. Uninsulated ductwork - Ventlok 555 or 560 Quadrants.

E. Insulated ductwork (inaccessible damper) - Ventlok 666 or 677 concealed damper regulator. Provide cable and remote manual actuator.

2.10 ACCESS DOORS:

A. Access doors shall be hinged, constructed of the same material as the ductwork. Door edges shall be sealed with 3/4 inch wide x 1/8 inch thick neoprene sponge gasketing. Door hardware shall be Ventlok #100 latches. Access doors on insulated ductwork shall be double wall construction with 1 inch of rigid 3 PCF fiberglass insulation.

B. Access doors shall be approximately 18 inches high by 24 inches wide. In smaller ductwork, the height shall be reduced to be 2 inches less than that of the ductwork.

PART 3 - INSTALLATION

3.1 GENERAL:

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction - Metal and Flexible," unless noted otherwise.

B. Ductwork hangers shall be supported from fasteners attached to structure.

C. Provide angles (same material as duct) at points where duct penetrates walls, to close off space between wall opening and duct.

D. Duct material and pressure classes have been identified on the drawings. Any duct shown on the drawing but not identified shall be low pressure galvanized steel. (2 inch W.G. 2500 fpm).

E. Install in the ductwork dampers and air measuring devices furnished by the Temperature Controls Sub-Contractor.

F. Install smoke detectors in ductwork.

G. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Refer to SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

H. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction" guidelines.

I. Repair fire proofing which was removed for ductwork installation. Installation to be done by an approved qualified tradesman.

J. Paint interiors of metal ducts, that do not have duct liner, for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer.

3.2 INDOOR DUCTWORK:

A. Suspend horizontal ducts on not to exceed 6 ft. spacing by galvanized steel straps 1 inch x no. 16 ga. for sizes up to 60 inch width, 1-1/2 inch x no. 16 ga. for sizes up to 96 inch width, and 2 x 2 x 1/4 inch trapeze shelf angles for ducts wider than 96 inches. Unless noted otherwise straps shall be fastened to sides of ducts with not less than two sheet metal screws. Bottom ends of straps shall hook 2 inches under ducts and be secured with a sheet metal screw through bottom of ducts (except watertight ducts).

B. Vertical ducts shall be supported at each floor by steel angles attached to the long sides of the duct. Angles shall rest on floor or steel framework and be secured to duct with sheet metal screws.

C. Support angles shall be sized according to duct size:

| Duct Size | Riser Support Size |
|---|---|
| Up to 36" | 1-¼ x 1-¼ x ¼ |
| Up to 48" | 1-½ x 1-½ x ¼ |
| Up to 60" | 2-½ x 2-½ x ¼ |
| Up to 72" | 3 x 3 x 5/16 |
| Up to 84" | 3 x 3 x 5/16 |
| Up to 96" | 4 x 4 x ¼ |

D. Support vertical ductwork or risers at every floor. Provide structural steel framing channels or wide flange shapes in shaft openings to support ductwork.

E. Water and other pipes shall not be allowed to pass through air risers or ducts, unless approved by the Engineers, and when this occurs, the size of said duct or riser shall be proportionately increased. Sanitary waste and vent piping shall not penetrate any ductwork.

3.3 DUCT SEALER:

A. All ductwork shall be as airtight as possible. Transverse seams shall be taped and sealed with two layers of United Sheet Metal, Uni-Cast or caulked with duct sealer.

3.4 FLEXIBLE CONNECTORS:

A. Install flexible connectors at all supply and exhaust fans and other air handling units with inlet and outlet duct or casing connections.

B. Connectors shall be suitable for the pressure of the units involved and shall be sealed airtight.

C. Connectors shall be not less than 4 inches long (in clear) and properly attached to duct and fan connection collar by 1 x 1/8 inch draw band (fabricated of the same material as adjacent ductwork) firmly clamped around collars in such a manner as to be airtight and secured to collars with sheet metal screws. Connectors shall not be painted.

D. Connectors shall not be used as transition pieces between fan and ductwork.

3.5 FLEXIBLE DUCTWORK:

A. Flexible ducts shall be used for straight runs of duct or offsets up to 45 degrees, but not exceeding 48 inches in length. The use of flexible ducts as elbows with more than a 45 degree bend will not be permitted.

B. Flexible ductwork shall be secured to rigid ductwork and unit openings by sliding the flexible duct over the rigid duct, sealing with an approved adhesive, clamping with a suitable clamp and taping.

3.6 DAMPERS:

A. Install dampers where shown or called for on the drawing. Install damper operating hardware.

3.7 DUCT ACCESS DOORS:

A. Provide duct access doors at all duct mounted devices requiring adjustment or resetting (e.g. fire dampers), at all ducted fan inlets, at the up stream side of all ducted filters and at the upstream side of all air measuring stations.

3.8 TESTING:

A. Perform the field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare tests reports.

B. The first 100 lin ft. section of ductwork installed shall be tested for leakage. Ductwork shall be tested at the duct pressure class (positive or negative depending on duct service), leakage shall be limited to 8 percent. Remake leaking joints and retest until leakage is equal

to or less than maximum allowable.

C. Owner may request additional tests at any time up to the time outlet devices or insulation is installed. Cost of additional testing will be paid by Owner, cost of repairing leaks and retesting shall be at no additional cost to the Owner.

END OF SECTION 15892

SECTION 15906 - TEMPERATURE CONTROLS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. The work included in this specification consists of furnishing all labor, material, accessories and equipment necessary for the temperature control system.

### 1.2 CODES AND STANDARDS:

A. Furnish and install an electric system of automatic temperature control as specified herein and as shown on the Contract drawings as manufactured by Honeywell, Johnson Controls, Invensys, or prior approved equal.

B. Extra costs incurred by use of other than base bid control system, such as wiring, contract drawings changes, changes in design, added supervision, etc., shall be the responsibility of the Temperature Control SubContractor (TCSC).

### 1.3 SUBMITTALS:

A. System documentation shall include the following:

1. Manufacturer's data sheets for all products.

2. Fully labeled system wiring schematics.

## PART 2 - PRODUCTS

### 2.1 THERMOSTATS:

A. HVAC Units:

1. Provide thermostat with the following features:

a. Seven Day Programming
b. Two Occupied/Two Unoccupied periods per day
c. Automatic heat/cool changeover with 5°F minimum dead band
d. Heating Stage control (as required by equipment)
e. Cooling Stage control (as required by equipment)
f. Touchscreen Display
g. Temperature Override
h. 5 Year Warranty

2. Thermostat shall be Honeywell VisionPro 8000 or equal.

### 2.2 ELECTRIC ACTUATORS:

A. Actuators shall be spring return type, which returns actuator shaft to its full normal mechanical travel upon power failure. Damper motor drive mechanism will include holding brake to keep the return spring from drawing the actuator from driving toward its normal position unless power is interrupted. Housing shall be die-cast aluminum.

B. Actuators shall be provided with mounting brackets, shaft linkage assemblies, and end

switches as required by sequence of operations.

C. Actuators shall include the following features:

1. Two position (on/off) control or modulating as required by sequence of operations.

2. Torque: 44 in lb.

3. Voltage: 24 volts AC.

4. Control Signal: 2-10V.

5. Operating Speed: 45 seconds for 2-position; 90 seconds for modulating.

D. Two position actuators shall be Honeywell MS8105 series or approved equal.

E. Modulating actuators shall be Honeywell MS7505 series or approved equal.

2.3 AUTOMATIC CONTROL DAMPERS:

A. All control dampers shall be standard products of damper or temperature control manufacturers unless noted otherwise. Local fabrication of dampers is not allowed.

B. Dampers and seals suitable for temperature ranges of -40 to 200 degrees F. Dampers shall be opposed blade type, and the Contractor shall submit construction data for all control dampers with the temperature control submittal. Damper shall be leakage Class 1A.

C. Dampers shall be Ruskin Model CD50. Greenheck and Air Balance are approved equals.

2.4 TEMPERATURE CONTROL WIRING:

A. All control wiring and conduit required to complete the temperature control system shall be provided by the Temperature Control Sub-Contractor.

2.5 SPLIT SYSTEM HVAC UNITS SEQUENCE OF OPERATIONS:

A. General:

1. The heating and cooling setpoints shall be individually adjustable in the program schedule. The thermostat shall have a minimum deadband of 5°F. No mechanical heating or cooling shall operate within this deadband. Space temperature deviation above the cooling setpoint or below the heating setpoint shall generate a demand signal to control the system.

2. The thermostat shall control the heating or cooling output based on the demand signal communicated from the thermostat program, taking into account both space temperature deviation (proportional gain) and the duration of that temperature deviation (integral gain).

3. The thermostat shall provide heating and cooling temperature range stops to limit temperature setpoint adjustments.

4. Initiation of heating setback or cooling setup for each of 7 days shall be provided by a programmed time schedule manually entered into the thermostat. The thermostat

shall provide two occupied and two unoccupied periods per day. When all or a portion of a manually programmed schedule is unavailable, the thermostat shall control to the default program schedule.

5. The thermostat shall provide adjustable recovery ramps for heating and cooling. The thermostat will begin heating or cooling recovery early to ensure that the temperature is reached at the scheduled time.

6. On loss of power, the thermostat shall maintain programmed times and temperatures for 10 years. Current time and date shall be maintained for a minimum of 4 years assuming 2 weeks of power outages each year.

7. The thermostat shall provide three levels of keypad lockout to prevent changes to the thermostat: Unlocked, Partial Lockout and Full Lockout.

B. Heating:

1. The thermostat shall energize heating equipment when space temperature falls below the heating setpoint. Heating setpoint shall be 68°F (adjustable).

2. The thermostat shall have a compressor outdoor lockout and auxiliary heat outdoor lockout to turn off the heat pump or auxiliary heat based on outdoor temperature. The control algorithm shall maintain the setpoint within +/- 2°F. The indoor temperature must drop to the auxiliary heat drop setting or the auxiliary heat upstage timer must expire before turning on the auxiliary heat.

C. Cooling:

1. The thermostat shall energize cooling equipment when space temperature exceeds the cooling setpoint. Cooling setpoint shall be 73°F (adjustable).

D. Fan Operation:

1. Fan shall operate continuously during Occupied mode and intermittently during Unoccupied mode.

E. Ventilation Air:

1. Outside air damper shall open during occupied mode and close during unoccupied mode. Outside air damper shall be normally closed and return to normal position upon loss of power. Outside air damper shall be closed in night setback operation.

F. Overrides:

1. Temporary Override: After touching the OVERRIDE button or adjusting the temperature setpoint, the thermostat shall use a pre-set occupied temperature. The new temperature will be maintained for 1 hour and can be adjusted up to the maximum override duration set by the owner.

2. Initiate Occupancy: The thermostat shall keep the temperature at an energy saving level until the user touches "Press to Start Occupancy" on the home screen. The thermostat returns to an energy saving level after the hold until time expires or the Occupied period ends.

G. Alarms:

1. The thermostat shall provide an alert on the display when the HVAC filter requires replacement or cleaning.

2. The thermostat shall provide an alert on the display when maintenance is required.

3. Unit shall shutdown on alarm from smoke detector or fire alarm system. Smoke detector alarm/trouble pilot shall be indicated on remote panel.

2.6 EXHAUST FANS SEQUENCE OF OPERATIONS:

A. Interlock exhaust fans as noted on schedule.

2.7 VENTILATION FANS SEQUENCE OF OPERATIONS:

A. Interlock ventilation fans as noted on schedule.

PART 3 - EXECUTION

3.1 GENERAL:

A. The entire control system, including low voltage wiring, with the exception of duct mounted automatic dampers and smoke detectors, shall be installed by the temperature control contractor, who shall make all tests and adjustments. All controls shall be field-tested and field-calibrated.

B. Set points of all controlling instruments are indicated at a specific point; however, all set points shall be adjustable up and down from the point indicated.

C. Contractor shall submit tentative locations of all control devices and components (including temperature sensors) to the Architect for written approval prior to installation.

D. Contractor shall pay particular attention to location of control devices and components to location of control devices and components. Effects of drafts, radiant heat, vibration, etc are to be considered when installing control devices and components.

E. Prior to ordering factory assembled equipment which contains integral control devices and components, the Contractor shall obtain a written statement from both the manufacturer and the installing contractor that they have reviewed the appropriate submittal data and are aware of the make, model, type, size, characteristics, etc. of the factory assembled control devices and components which they shall be required to interface to and/or control.

F. All control devices (both field and panel mounted) shall be labeled to indicate both their control systems designation, e.g., RTU-1 THERMOSTAT. Unless indicated otherwise, abbreviations and acronyms for all ID tags and panel faceplates shall be approved by the Engineer.

G. All control devices are to be mounted in accessible locations. All devices exposed to the weather shall be housed in weatherproof enclosures.

3.2 ELECTRIC WIRING:

A. Electric connections between the various unit control cabinets shall be made by the TCSC. All wiring must be tagged on both ends with panel number and terminal number.

B. The TCSC is responsible for all required process and electrical connections to all equipment, control devices, and field instruments.

C. TCSC shall furnish and install all conduits, raceways, etc., required. TCSC shall furnish and install all control and interlock wiring.

D. All wiring shall conform to standards and specifications outlined in Division 16. Wire size shall be in accordance with manufacturer's recommendations and National Electric Code. Minimum conduit shall be 1/2 inch diameter.

E. TCSC shall furnish and install all required auxiliary starter contacts or relays, etc., for a complete electrical interlock and control wiring system.

F. TCSC shall coordinate all control power requirements with electrical contractor prior to bid.

3.3 ELECTRIC ACTUATORS:

A. Provide electric motor operators for all control dampers as required by the sequence of operations.

3.4 AUTOMATIC DAMPERS:

A. Furnish for installation by the Mechanical Contractor all motor operated control dampers.

3.5 DRAWINGS:

A. At the completion of the job, TCSC shall correct his drawings to include any changes made during construction.

B. TCSC shall provide color-coded drawings indicated all temperature zones and equipment (3 copies).

3.6 OPERATION TEST:

A. At completion, TCSC shall operate the system for a period of at least three days of eight hours each on the new systems to demonstrate fulfillment of the requirements of the contract. During this time, all adjustments shall be made to the equipment so that it is in first-class operating condition. The entire system is to be left in operating condition acceptable to the Engineer.

3.7 OWNER'S INSTRUCTION:

A. Upon completion of the work and acceptance by the Owner, TCSC shall provide one scheduled four-hour period of formal instruction to the Owner's operating personnel who have responsibility for the mechanical system.

END OF SECTION 15906

SECTION 15936 - REGISTERS, GRILLES, AND DIFFUSERS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the air distribution outlets, exhaust and return air devices, and the accessories required for complete installation.

### 1.2 CODES AND STANDARDS:

A. ANSI/ASHRAE 70 *Method of Testing For Rating The Performance of Air Outlets and Inlets.*

B. ASHRAE 113 *Method of Testing For Room Air Diffusion.*

### 1.3 SUBMITTALS:

A. Submittals shall include the following:

1. Manufacturers technical literature for

   a. Performance
   b. Static pressure drop
   c. Throw
   d. Sound pressure loss (NC)

2. Pictorial literature.

### 1.4 ACCEPTABLE MANUFACTURERS:

A. Acceptable Manufacturers are Titus, Price, Krueger or prior approved equal.

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Product performance data shall be taken from tests conducted in accordance with ANSI/ASHRAE 70, and ARI-890.

B. Grilles and registers including volume controllers shall be constructed of the same materials specified for the grille.

C. The grille finish shall be white unless noted otherwise. The finish shall be an anodic acrylic paint baked at 315°F for 30 minutes.

D. Refer to architectural drawings for the various types of ceilings, i.e., mineral tile or plaster to assure that air devices have the correct type of mounting. Refer to drawings of reflected ceiling plans for location of ceiling diffusers and grilles.

E. Supplier shall check all air distribution and return air devices for proper performance, noise and accessories. Any device exceeding noise level herein specified shall be brought to the attention of the Engineers.

F. Contractor shall coordinate openings in hard ceilings, furred walls, masonry walls, and floors.

G. The nominal or duct connection size of grilles (not overall dimensions) is given on plans.

H. Mounting frames shall be provided for all grilles and registers mounted in drywall, plaster, concrete or masonry openings.

I. Devices are defined in the following manner in this section:

| Device | Abbreviation used on the Drawings |
|---|---|
| Ceiling Diffuser | CD |
| Return Grille | RG |
| Transfer Grille | TG |

J. A third letter following these abbreviations refers to the type of device which is defined herein.

2.2 CEILING DIFFUSER:

A. Type A - Titus Model OMNI steel square panel diffuser with 24 x 24 inch module and 18 x 18 inch face panel. Diffuser shall include round neck, removable 22 gauge face panel and equalizing grid. Diffuser shall be suitable for lay-in installation with air pattern as shown on drawings. Provide with manufacturer's molded insulation backpan.

2.3 RETURN/TRANSFER GRILLES:

A. Type A - Titus Model 350 RL steel grille. Grille shall include one set of fixed blades set at 35° deflection on 3/4 inch spacing. Grille shall be suitable for lay-in or surface mounted installation.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Provide air devices as indicated on the drawings. Mount each device securely to avoid rattling and vibration

B. Devices shall be parallel to the plane of the surfaces they are mounted.

END OF SECTION 15936

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing (T/A/B) as required to meet design specifications, plus recording and reporting the results.

### 1.2 SUMMARY:

A. Prior to acceptance and before final inspection, test and balance the air and water systems as listed herein and as specified hereinafter and submit reports as specified hereinafter.

B. The mechanical contractor has numerous responsibilities associated with the test and balance, it is imperative that the test and balance contractor coordinate these responsibilities with them.

C. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure ranges;
2. Return air systems;
3. Exhaust air systems;
4. Verify temperature control system operation.

D. This Section does not include:

1. Testing boilers and pressure vessels for compliance with safety codes;

2. Specifications for materials for patching mechanical systems;

3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

### 1.3 CODES AND STANDARDS:

A. Applicable publications: The following publications form a part of this specification, to the extent that they represent minimum standards. Where this specification exceeds these standards, this specification shall be followed.

B. Associated Air Balance Council (AABC) National Standards or Field Measurement and Instrumentation, latest edition.

C. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbook - Fundamentals, latest edition.

D. Chapters on Testing, Adjusting, and Balancing of Environmental Systems and Related Subjects, ASHRAE Handbook - Systems, latest edition.

E. National Environmental Balancing Bureau (NEBB)

F. Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, latest edition.

G. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) HVAC System - Testing, Adjusting and Balancing, latest edition.

1.4 QUALIFICATIONS FOR TEST AND BALANCE CONTRACTOR:

A. The test and balance contractor shall be an independent contractor that regularly performs air and water systems testing and balancing. Minimum qualifications for acceptance shall be general membership in NEBB or AABC, except that affiliation with manufacturers, installing, contractors, or engineering firms may not preclude acceptance.

B. Supervisor directly in charge of the water and air testing and balancing work shall be a registered professional engineer, in the state where the project is located, with not less than five (5) years experience in the mechanical contracting industry and not less than two (2) years experience in testing and balancing of heating, ventilating, and air conditioning systems. The supervisor shall stamp the title page of the test and balance report with his professional engineer's stamp.

C. The supervisor and the lead test and balance mechanic shall be certified as test and balance technicians by one or more of the following groups, AABC, NEBB, SMACNA, ASHRAE, or the Sheet Metal Workers Union.

D. Instrument calibration: Calibrate all instruments required for air and water balancing within a period of six months prior to their use on this project, per NEBB or AABC standards and the instrument manufacturers.

E. Tests shall be conducted in presence of the Architect-Engineer and/or the Owner or their representatives. Notify the Architect-Engineer and Owner in writing five working days before the start of testing.

1.5 DEFINITIONS:

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to increase or reduce fan speeds or adjust a damper.

B. Balance: To proportion flows within the distribution system, including sub-mains, branches, and terminals, according to design quantities.

C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

E. Report Forms: Test data sheets for recording test data in logical order.

F. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

G. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the

fan was performance tested.

H. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

I. Test: A procedure to determine quantitative performance of a system or equipment.

J. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.

K. AABC: Associated Air Balance Council.

L. AMCA: Air Movement and Control Association.

M. ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

N. CTI: Cooling Tower Institute.

O. NEBB: National Environmental Balancing Bureau.

P. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.6 SUBMITTALS:

A. Certified Testing, Adjusting, and Balancing Reports: Submit 6 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

B. Sample Report Forms: Submit 2 sets of sample testing, adjusting, and balancing report forms.

1.7 QUALITY ASSURANCE:

A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.

B. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports

2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.

C. Testing, Adjusting, and Balancing Reports: Use testing, adjusting, and balancing Agent's standard forms approved by the Engineer.

D. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.

E. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.8 COORDINATION:

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.

C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 THE MECHANICAL CONTRACTOR'S RESPONSIBILITIES:

A. Furnish the test and balance contractor one complete set of accepted equipment data and one complete set of accepted mechanical shop drawings.

B. The mechanical contractor shall be responsible for advising the test and balance contractor of any change(s) made to the system(s) during the construction process.

C. Mechanical contractor shall provide drawings, specifications, shop drawings, control diagrams, etc. detailing the change(s) to the test and balance contractor.

D. Replace and/or install pulleys, belts, dampers and trim pump impellers as required for the correct balance as directed by the test and balance contractor.

E. Existing air systems having variable pitch pulleys shall have them replaced with fixed pitched pulleys prior to final; acceptance. Belts and pulleys shall be provided as directed by test and balance contractor.

F. Allocate time in the construction schedule for test and balance procedure.

G. Assist the test and balance contractor in coordinating work with the other trades.

H. Place all systems and necessary allied devices required, and only those required, for each working day of the testing and balancing procedures into "Full Call" operation. At the completion of the testing and balancing procedures for the day, the mechanical contractor shall return the systems to normal operation or shut them down.

I. Prepare the air side system for testing and balancing as follows, (all new and existing devices are included):

1. Mechanically check all rotating air devices, to insure that the devices are capable of operation under normal design modes and have correct rotation and the related automatic controls are functional and calibrated.

2. All balancing, splitter, volume, fire and smoke control, and V.A.V. dampers shall be in their respective neutral position or fully open. All locking devices shall be functional and secured.

3. All air distribution inlet and outlet devices (i.e., grilles, registers, diffusers, and etc.) shall be fully open. All locking devices shall be functional and secured.

4. All automatic controls (i.e., direct digital, electronic, electric, pneumatic, hydraulic and/or any combination thereof) shall be mechanically and electrically checked and be available to operate under design conditions.

5. Air control locking devices (i.e., control rods, quadrants, and etc.) shall be permanently marked to represent the true position of their respective control surfaces. The locking devices markings shall be inconspicuous in occupied areas.

6. Install new air filters before the start of testing and as directed by the test and balance contractor in order to meet design conditions of the air handling devices. Provide air control devices, such as balancing dampers, as per the drawings and specifications, and as directed by the test and balance contractor in order to obtain the proper balance conditions.

7. Mechanically check variable volume air devices for all operational modes. Verify devices operate, no loose linkage, damper blades, parts move freely as intended.

J. Prepare the water side of systems for testing and balancing as follows (all new and existing devices are included):

1. Open all balancing and normally open isolation valves to the full open position. Control valves shall be fully open to their coils. Close all bypass valves. All line strainers shall be removed and cleaned.

K. Check and verify that all manual and automatic air vents and the expansion tank and water fill systems are installed and operating properly. Verify that systems are full of water and not air bound.

L. The system(s) operational cost(s), during testing and balancing procedures is the Owner's responsibility.

3.2 EXAMINATION:

A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.

1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.

2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine equipment performance data, including fan ![and pump] curves. Relate

performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

D. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

E. Examine system and equipment test reports.

F. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

G. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

H. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine terminal units, such as variable-air-volume boxes and mixing boxes, to verify that they are accessible and their controls are connected and functioning.

J. Examine plenum ceilings, utilized for supply or return air, to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.

K. Examine strainers for clean screens and proper perforations.

L. Examine 3-way valves for proper installation for their intended function of diverting or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine pumps to ensure absence of entrained air in the suction piping.

O. Examine equipment for installation and for properly operating safety interlocks and controls.

P. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices operate by the intended controller.

2. Dampers and valves are in the position indicated by the controller.

3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in mixing boxes, and

variable-air-volume terminals.

4. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.

5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.

6. Sensors are located to sense only the intended conditions.

7. Sequence of operation for control modes is according to the Contract Documents.

8. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.

9. Interlocked systems are operating.

10. Changeover from heating to cooling mode occurs according to design values.

Q. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.3 PREPARATION:

A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.

2. Automatic temperature-control systems are operational.

3. Equipment and duct access doors are securely closed.

4. Balance, smoke, and fire dampers are open.

5. Isolating and balancing valves are open and control valves are operational.

6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.

7. Windows and doors can be closed so design conditions for system operations can be met.

3.4 GENERAL TESTING AND BALANCING PROCEDURES:

A. Perform testing and balancing procedures on each system according to the procedures contained in 2019 ASHRAE Applications Handbook Chapter 39, AABC or NEBB national standards and this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.5 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES:

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

E. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling unit components.

3.6 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES:

A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems. Additional procedures are required for variable-air-volume, multizone, dual-duct, induction-unit supply-air systems and process exhaust-air systems. These additional procedures are specified in other articles in this Section.

B. Adjust fans to deliver total design airflow within the maximum allowable rpm listed by the fan manufacturer.

1. Measure fan static pressures to determine actual static pressure as follows:

a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.

b. Measure static pressure directly at the fan outlet or through the flexible connection.

c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.

d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each air-handling unit component.

a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

3. Measure static pressures entering and leaving other devices such as sound traps under final balanced conditions.

4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. The Contractor shall make recommended corrective changes to align design and actual conditions.

5. Adjust fan speed higher or lower than design, as necessary to attain design flow and pressure values. The Contractor shall make required replacements or adjustments to pulleys and belts to accommodate fan-speed changes.

6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower. The Contractor shall replace any equipment that does not perform as stated in the submitted product literature.

C. Adjust volume dampers for main duct, sub-main ducts, and major branch ducts to design airflows within specified tolerances.

1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.

a. Where sufficient space in sub-mains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Remeasure each sub-main and branch duct, after all have been adjusted. Continue to adjust sub-mains and branch ducts to design airflows within specified tolerances.

D. Measure terminal outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.

E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than

extractors and the dampers at the air terminals.

1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.

2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.7 MOTORS:

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer, model, and serial numbers.

2. Motor horsepower rating.

3. Motor rpm.

4. Efficiency rating if high-efficiency motor.

5. Nameplate and measured voltage, each phase.

6. Nameplate and measured amperage, each phase.

7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.8 HEAT-TRANSFER COILS:

A. Water Coils: Measure the following data for each coil:

1. Entering- and leaving-water temperatures.

2. Dry-bulb temperatures of entering and leaving air.

3. Wet-bulb temperatures of entering and leaving air.

4. Airflow.

5. Air pressure drop.

B. Electric-Heating Coils: Measure the following data for each coil:

1. Nameplate data.

2. Airflow.

3. Entering- and leaving-air temperatures at full load.

4. Voltage and amperage input of each phase at full load and at each incremental stage.

5. Calculated kW at full load.

6. Fuse or circuit-breaker rating for overload protection.

3.9 TEMPERATURE TESTING:

A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.10 TEMPERATURE-CONTROL VERIFICATION:

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Verify free travel and proper operation of control devices such as damper and valve operators.

F. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water-flow measurements. Note the speed of response to input changes.

G. Confirm interaction of electrically operated switch transducers.

H. Confirm interaction of interlock and lockout systems.

I. Verify main control supply-air pressure and observe compressor and dryer operations.

J. Record voltages of power supply and controller output. Determine if the system operates on a grounded or nongrounded power supply.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.11 TOLERANCES:

A. Set HVAC system airflow rates within the following tolerances:

1. Supply and Exhaust Fans: Plus 5 to plus 10 percent.

2. Air Outlets and Inlets: 0 to minus 10 percent.

3.12 REPORTING:

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.13 FINAL REPORT:

A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems. All data may not apply to all project devices, provide data as applicable to the piece of equipment being tested.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

1. Include a list of the instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to the certified field report data, include the following:

1. Fan curves.

2. Manufacturers' test data.

3. Field test reports prepared by system and equipment installers.

4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:

1. Title page.

2. Name and address of testing, adjusting, and balancing Agent.

3. Project name.

4. Project location.

5. Engineer's name and address.

6. Contractor's name and address.

7. Report date.

8. Signature of testing, adjusting, and balancing Agent who certifies the report.

9. Summary of contents, including the following:

   a. Design versus final performance.

   b. Notable characteristics of systems.

   c. Description of system operation sequence if it varies from the Contract Documents.

10. Nomenclature sheets for each item of equipment.

11. Data for terminal units, including manufacturer, type size, and fittings.

12. Notes to explain why certain final data in the body of reports vary from design values.

13. Test conditions for fans performance forms, including the following:

   a. Settings for outside-, return-, and exhaust-air dampers.

   b. Conditions of filters.

   c. Cooling coil, wet- and dry-bulb conditions.

   d. Fan drive settings, including settings and percentage of maximum pitch diameter.

   e. Settings for supply-air, static-pressure controller.

   f. Other system operating conditions that affect performance.

E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:

1. Quantities of outside, supply, return, and exhaust airflows.

2. Duct, outlet, and inlet sizes.

3. Pipe and valve sizes and locations.

4. Terminal units.

5. Balancing stations.

F. Air-Handling Unit Energy Recovery Ventilator and Packaged Terminal Heat Pump Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:

a. Unit identification.

b. Location.

c. Make and type.

d. Model number and unit size.

e. Manufacturer's serial number.

f. Unit arrangement and class.

g. Discharge arrangement.

h. Sheave make, size in inches, and bore.

i. Sheave dimensions, center-to-center and amount of adjustments in inches.

j. Number of belts, make, and size.

k. Number of filters, type, and size.

2. Motor Data: Include the following:

a. Make and frame type and size.

b. Horsepower and rpm.

c. Volts, phase, and hertz.

d. Full-load amperage and service factor.

e. Sheave make, size in inches, and bore.

f. Sheave dimensions, center-to-center and amount of adjustments in inches.

3. Test Data: Include design and actual values for the following:

a. Total airflow rate in cfm.

b. Total system static pressure in inches wg.

c. Fan rpm.

d. Discharge static pressure in inches wg.

e. Filter static-pressure differential in inches wg.

f. Preheat coil static-pressure differential in inches wg.

g. Cooling coil static-pressure differential in inches wg.

h. Heating coil static-pressure differential in inches wg.

i. Outside airflow in cfm.

j. Return airflow in cfm.

k. Outside-air damper position.

l. Return-air damper position.

G. Apparatus-Coil Test Reports: For apparatus coils, include the following as applicable to the installed equipment:

1. Coil Data: Include the following:

a. System identification.

b. Location.

c. Coil type.

d. Number of rows.

e. Fin spacing in fins per inch.

f. Make and model number.

g. Face area in sq. ft.

h. Tube size in NPS.

i. Tube and fin materials.

j. Circuiting arrangement.

2. Test Data: Include design and actual values for the following:

a. Airflow rate in cfm.

b. Average face velocity in fpm.

c. Air pressure drop in inches wg.

d. Outside-air, wet- and dry-bulb temperatures in deg F.

e. Return-air, wet- and dry-bulb temperatures in deg F.

f. Entering-air, wet- and dry-bulb temperatures in deg F.

g. Leaving-air, wet- and dry-bulb temperatures in deg F.

h. Refrigerant type.

i. Refrigerant suction pressure in psig.

j. Refrigerant suction temperature in deg F.

H. Electric-Coil Test Reports: For electric coils installed in air-handling units, include the following, where applicable:

1. Unit Data: Include the following:

a. System identification.

b. Location.

c. Coil identification.

d. Capacity in kW.

e. Number of stages.

f. Connected volts, phase, and hertz.

g. Rated amperage.

h. Airflow rate in cfm.

i. Face area in sq. ft.

j. Minimum face velocity in fpm.

2. Test Data: Include design and actual values for the following:

a. Heat output in kW.

b. Airflow rate in cfm.

c. Air velocity in fpm.

d. Entering-air temperature in deg F.

e. Leaving-air temperature in deg F.

f. Voltage at each connection.

g. Amperage for each phase.

I. Fan Test Reports: For supply and exhaust fans, include the following:

1. Fan Data: Include the following:

a. System identification.

b. Location.

c. Make and type.

d. Model number and size.

e. Manufacturer's serial number.

f. Arrangement and class.

g. Sheave make, size in mm, and bore.

h. Sheave dimensions, center-to-center and amount of adjustments in inches.

2. Motor Data: Include the following:

a. Make and frame type and size.

b. Horsepower and rpm.

c. Volts, phase, and hertz.

d. Full-load amperage and service factor.

e. Sheave make, size in inches, and bore.

f. Sheave dimensions, center-to-center and amount of adjustments in inches.

g. Number of belts, make, and size.

3. Test Data: Include design and actual values for the following:

a. Total airflow rate in cfm.

b. Total system static pressure in inches wg.

c. Fan rpm.

d. Discharge static pressure in inches wg.

e. Suction static pressure in inches wg.

J. Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data: Include the following:

a. System and air-handling unit number.

b. Location and zone.

c. Traverse air temperature in deg F.

d. Duct static pressure in inches wg.

e. Duct size in inches.

f. Duct area (sq. ft).

g. Design airflow rate in cfm.

h. Design velocity in fpm.

i. Actual airflow rate in cfm.

j. Actual average velocity in fpm.

k. Barometric pressure in psig.

K. Air-Terminal-Device Reports: For terminal units, include the following:

1. Unit Data: Include the following:

a. System and air-handling unit identification.

b. Location and zone.

c. Test apparatus used.

d. Area served.

e. Air-terminal-device make.

f. Air-terminal-device number from system diagram.

g. Air-terminal-device type and model number.

h. Air-terminal-device size.

2. Test Data: Include design and actual values for the following:

a. Airflow rate in cfm.

b. Air velocity in fpm.

c. Preliminary airflow rate as needed in cfm.

d. Preliminary velocity as needed in fpm.

e. Final airflow rate in cfm.

f. Final velocity in fpm.

g. Space temperature in deg F.

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data: Include the following:

a. System and air-handling unit identification.

b. Location and zone.

c. Room or riser served.

d. Coil make and size.

e. Flowmeter type.

2. Test Data: Include design and actual values for the following:

a. Airflow rate in cfm.

b. Entering-water temperature in deg F.

c. Leaving-water temperature in deg F.

d. Entering-air temperature in deg F.

e. Leaving-air temperature in deg F.

M. Condenser Reports: For refrigerant side of unitary systems, air-cooled condensing units include the following:

1. Unit Data: Include the following:

a. Unit identification.

b. Location.

c. Unit make and model number.

d. Manufacturer's compressor serial numbers.

e. Compressor make.

f. Compressor model and serial numbers.

g. Refrigerant weight in pounds.

h. Low ambient temperature cutoff in deg F.

2. Test Data: Include design and actual values for the following as applicable to the equipment installed:

a. Entering-air, dry-bulb temperature in deg F.

b. Leaving-air, dry-bulb temperature in deg F.

c. Control settings.

d. Unloader set points.

e. Low-pressure-cutout set point in psig.

f. High-pressure-cutout set point in psig.

g. Suction pressure in psig.

h. Suction temperature in deg F.

i. Condenser refrigerant pressure in psig.

j. Condenser refrigerant temperature in deg F.

k. Voltage at each connection.

l. Amperage for each phase.

m. The kW input.

n. Crankcase heater kW.

o. Number of fans.

p. Condenser fan motor make, frame size, rpm, and horsepower.

q. Condenser fan motor voltage at each connection.

r. Condenser fan motor amperage for each phase.

N. Instrument Calibration Reports: For instrument calibration, include the following:

1. Report Data: Include the following:

a. Instrument type and make.

b. Serial number.

c. Application.

d. Dates of use.

e. Dates of calibration.

3.14 ADDITIONAL TESTS:

A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION 15990

Margaret Elementary School Classroom Addition

**Pinnacle** Project #23198

Specification Index

## PLUMBING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS:

A. The "General Conditions", "Supplementary Conditions", Statutory Declarations, Special Conditions and Division 1 of the specifications as written and referred to are adopted and made part of Division 15.

### 1.2 SUBMITTALS:

A. Submittals shall include the documents listed below:

1. Certificates of Inspection and Approval.
2. Qualifications of Superintendent.
3. Warranties.
4. List of proposed material manufacturers.
5. Operating and Maintenance Manuals.
6. Record As-Built prints.
7. Record electronic As-Built drawings

### 1.3 DESCRIPTION OF WORK:

A. Provide equipment, labor, material, etc., required to make a complete working installation as shown or as specified.

B. Equipment and materials used in the work shall be:

1. In accordance with the contract documents.
2. The best quality and grade for the use intended.
3. New and unused.
4. The manufacturer's latest standard or current model.

C. All equipment and method shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations.

1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as

motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3. Contractor is responsible for dimensions and sizes of equipment. Inform Architect in writing of equipment differing from that shown.

D. Mechanical work includes, but is not limited to:

1. Make arrangements with local utility company for services as shown or specified.

2. Obtain all permits and inspections.

3. Complete alterations and additions to the domestic hot and cold water system. Provide sanitary rinse and flush.

4. Complete alterations and additions to the interior sanitary sewer.

5. Complete insulation on piping, ductwork and equipment.

6. Complete alterations and additions to refrigerant piping system.

7. Complete alterations and additions to the air cooled condensing units.

8. Complete alterations and additions to air handling systems and ventilating systems.

9. Complete alterations and additions to the ductwork.

10. Install devices furnished by the Temperature Controls sub-contractor.

11. Testing and Balancing will be by Independent Agency paid by this Contractor.

12. Provide vibration isolation devices for all rotating or reciprocating equipment and piping connected to that equipment.

13. Provide roofing including flashing, and counter flashing for roof mounted equipment, roof penetrations and supports for work in this Division, unless noted otherwise.

1.4 UTILITY CONNECTIONS:

A. Arrange with local utility companies for utility service connections, taps, meters and installation. Pay all fees and charges (if any) necessary for the utility services shown on the drawings or listed in the specifications.

B. It is the responsibility of the Contractor to re-confirm with the Utility Companies, prior to bidding, that locations, arrangements, line sizes, pressures, interruptions, shut downs, etc. are in accordance with their regulations and requirements.

C. If the utility company requirements are at variance with these drawings and specifications, this Contractor shall include the utility company requirements in his work without additional cost to the Owner.

D. Obtain from Utility Company any additional charges for service of type, size and location called for. Include charges in bid to be paid by Contractor to appropriate party. Provide payment of these charges so as to allow logical progression of construction and avoid delay

of completion.

E. Should cost above not be available prior to bid, submit with bid a letter signed by responsible Utility Company personnel stating that cost is not available. Prime Contractor shall submit letter with his bid to Owner. Cost will then be omitted from contract and become responsibility of Owner.

F. Furnish with shop drawings a signed document from each utility company describing location and type of service to be supplied and requirements for service. Document shall be signed by the appropriate responsible representative of the respective utility company.

1.5 WORK IN EXISTING BUILDINGS:

A. Existing mechanical (HVAC and plumbing) systems serving spaces involved in construction, or areas affected by construction, must be maintained and protected.

B. Contractor shall protect existing systems to keep them operational, or shall relocate the systems to keep them operational.

C. Temporary systems shall maintain the same level of capacity, protection, and safety provided by the permanent system being modified.

D. Coordinate routing of temporary systems and scheduling of interruptions with General Contractor , other trades, and Owner.

E. Disconnect and remove temporary systems when permanent systems are installed and running.

F. Contractor shall prepare drawings showing proposed methods of modifying existing systems (Work Around Plans) to maintain services to existing spaces during construction.

1.6 WORK NOT INCLUDED:

A. Finish painting of piping, ductwork or equipment.

B. Electrical wiring and conduits shown on the electrical drawings.

1.7 RELATED WORK SPECIFIED ELSEWHERE:

A. Electrical: Division 16.

1.8 REQUIREMENTS OF REGULATORY AGENCIES:

A. Obtain and pay for all permits required for the work. Comply with all ordinances pertaining to work described herein.

B. Install the work under this Division in accordance with drawings and specifications and the standards and codes (latest edition) that apply to this work. In the event of a conflict, install work in accordance with the most stringent code requirements determined by Architect.

C. Arrange, pay for and complete work to pass required tests by agencies having authority over work. Deliver to Architect Certificates of Inspection and approval issued by authorities.

1.9 QUALIFICATION OF CONTRACTOR:

A. Has completed minimum two projects same size and scope in past five (5) years.

B. This qualification applies to Sub-Contractors.

C. Use workmen experienced in their respective trade. Submit qualifications of Superintendent for review.

D. Owner reserves right to reject bid of any Contractor failing to meet these qualifications.

1.10 GENERAL JOB REQUIREMENTS:

A. Drawings and Specifications:

1. Work for the mechanical trades are shown on the drawings series M (HVAC) and P (Plumbing).

2. Drawings and specifications are complementary. Work called for by one is binding as if called for by both.

3. Drawings are drawn to a small scale and are diagrammatic only. The drawings indicate size and general arrangement of equipment.

4. Do not scale drawings for exact locations. Refer to architectural drawings. Field measurements take precedence.

B. Provide necessary offsets, elbows and fittings as required to avoid conflict with equipment of other Divisions and to obtain proper headroom and clear passageways. This shall be done at no additional cost to the Owner.

C. Visit to Site/Work in other Division:

1. Examine not only the plans and specifications for this Division, but plans and specifications of the other Divisions of work and visit the site to become acquainted with existing conditions. Execution of Contract is evidence that Contractor has examined all drawings and specifications, and that all conditions which have a bearing in any way on the manner of installing the work in this Division are known. Later claims for labor and materials required due to difficulties encountered, which could have been foreseen had examination been made, will not be recognized.

D. Underground Utilities/Concealed Utilities:

1. All utilities and services, whether shown on the drawings or not, shall be suitably protected and maintained, and any damages thereto shall be promptly repaired. Owner shall be advised immediately of any damages sustained. If any extra expense is incurred due to the existence of buried utilities not shown on the drawings, or the location of which is not made known to the Contractor, the contract price shall be adjusted in accordance with the General Conditions. The Contractor shall advise the Owner three (3) days in advance of any operation which could possibly disrupt any underground utility. The Contractor shall utilize locator services to mark any underground utilities in the area he is working in, and shall make any other measure deemed necessary to avoid utility disruption.

E. Definitions:

| | | |
|---|---|---|
| 1. | Concealed: | Materials or systems not visible. Work installed above a ceiling, furred behind a wall or enclosed in a chase. |
| 2. | Exposed: | Materials or systems that are visible. Work installed in a room without a ceiling. Work not enclosed by walls. |
| 3. | Provide: | Furnish, install and make complete. |
| 4. | Install: | Receive, unload, move into place, and make connections. |
| 5. | Work: | Materials completely installed and connected. |
| 6. | ADC: | Air Diffusion Council. |
| 7. | AGA: | American Gas Association. |
| 8. | AMCA : | Air Movement and Control Association. |
| 9. | ANSI: | American National Standard Institute. |
| 10. | API: | American Petroleum Institute. |
| 11. | ARI: | American Refrigeration Institute. |
| 12. | ASHRAE: | American Society of Heating, Refrigerating and Air Conditioning Engineers. |
| 13. | ASME: | American Society of Mechanical Engineers. |
| 14. | ASTM: | American Society of Testing Materials. |
| 15. | AWS : | American Welding Society. |
| 16. | FM: | Association of Factory Mutual Fire Insurance Company. |
| 17. | MSS: | Manufacturer's Standard Society of the Valve and Fittings Industry, Inc. |
| 18. | NEC: | National Electrical Code. |
| 19. | NEMA: | National Electrical Manufacturer's Association. |
| 20. | NFPA: | National Fire Protection Association. |
| 21. | NRCA : | National Roofing Contractors Association. |
| 22. | NSF: | National Sanitation Foundation. |
| 23. | OSHA: | Occupational Safety and Health Act. |
| 24. | PDI: | Plumbing Drainage Institute. |
| 25. | SMACNA: | Sheet Metal and Air Conditioning Contractors National Association. |

26. Standard: Building Code, Gas Code, Mechanical Code, Plumbing Code.

27. UL: Underwriters Laboratories.

F. Workmanship, Warranty and Acceptance:

1. Work under this Division shall be first class with emphasis on neatness and workmanship.

2. Install work using competent mechanics, under supervision of foreman, all duly certified by local authorities. Installation subject to Architect's or Engineer's observation, final approval, and acceptance. Architect or Engineer may reject unsuitable work.

3. Furnish Architect written warranty, stating that if workmanship and/or materials executed under this Division is proven defective within one (1) year after final acceptance, such defects and other work damaged will be repaired and/or replaced.

4. In event that project is occupied or system placed in operation in several phases at Owner's request, warranty will begin on date each system or item of equipment is accepted by Owner.

G. Observations of Work and Demonstration of Operation:

1. When observations are scheduled, provide sufficient personnel to expedite removal of access doors, coverplates, manholes covers, etc.

2. Contractor to assist Architect or Engineer in demonstration of operation of new systems to satisfaction of Owner. Contractor to have manpower available for demonstration of systems where requested by Owner.

H. Materials and Substitutions:

1. All materials shall be new. All materials and equipment for which a UL Standard, an AGA approval, an AWWA standard, FM listing or ASME requirements is established, shall be so approved and labeled or stamped.

2. Wherever in these specifications products are specified by manufacturer's name, bids shall be based on the named products. Where more than one manufacturer's name is mentioned, the one first listed establishes the standard for that product. If the bidder desires to submit a product of a manufacturer other that listed first, it must be the equivalent of the one listed first.

3. The drawings are based on the use of products specified and listed first. If any revision in piping, conduit work, foundations, anchor bolts, connections, etc., is required by other named products or approved substitutions, it shall be the Contractor's responsibility to make such revisions at no additional expense to the Owner.

4. If any bidder desires to submit products of manufacturers not listed, he may submit a request for prior approval to the Engineer no later than 10 days prior to the bid date. If the Engineer decides to accept the manufacturers, they will be listed as "Approved" by written addendum.

5. If the manufacturers are not listed as approved either by addendum or in the specifications, they will not be accepted.

6. Submit to Architect a complete list of proposed material manufacturers. List does not preclude submission of shop drawings. Approval of manufacturer or list does not constitute approval of specific material or equipment.

I. Operating and Maintenance Manuals:

1. Provide maintenance and operating manuals bound in 8-1/2" x 11" hardback, three-post binders. Manuals shall contain written instructions for each system, shop drawings, schematic drawings, equipment catalog cuts, manufacturer's instructions, manufacturers warranties, and valve tag list.

2. Arrange information in the following sequence: title of job, Owner, address, date of submittal, name of Contractor, name of Engineer, index, shop drawings, operating instruction, Contractor's purchase order numbers, supplier's name and address, date of start-up of each piece of equipment and valve tag list.

3. Submit one (1) copy for review. Make required corrections, and submit two (2) record copies.

J. Record As-Built Prints:

1. Provide Record As-Built prints at the completion of job. Keep set of prints on job and record day to day changes to Contract drawings with red pencil. Indicate actual location of piping, ductwork, valves, dampers, and equipment. Turn over prints to Architect at final observation.

2. Provide the following items for Owner at time of substantial completion:

a. Certificates of inspection and approval from authorities having jurisdiction.

b. Warranties.

c. Record As-Built prints.

d. Record As-Built plans in electronic (PDF) format.

e. Operating and Maintenance Manuals (3 copies).

f. Operating and maintenance manuals - PDF files on DVD disk.

g. Spare Parts (furnish receipt).

h. Affidavit of Owner Instruction (1 copy).

i. Release of Liens.

1.11 PROTECTION AND STORAGE:

A. Provide warning lights, bracing, shoring, rails, guards and covers necessary to prevent damage or injury.

B. Protect all equipment and materials, from damage by weather, entrance of water or dirt. Cap open piping, use plastic covers made for that purpose. Do not use rags or construction debris.

C. Avoid damage to materials and equipment in place. Repair, or remove and replace damaged work and materials.

D. Protect all surfaces from weld spatter, solder and cutting oil.

E. Deliver equipment and materials to job site in original, unopened, labeled container. Store to prevent damage and injury. Store ferrous materials to prevent rusting. Store finished materials and equipment to prevent staining and discoloring. Store materials affected by condensation in warm dry areas. Provide heaters. Storage space on site and in building designated by Owner/Architect.

END OF SECTION 15010

## 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 procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

### 1.3 DEFINITIONS:

A. Action Submittals: Written and graphic information that requires Engineer's through the Architect responsive action.

### 1.4 SUBMITTAL PROCEDURES:

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer through the Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Concurrent Review: Where concurrent review of submittals by other consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.

a. Division 15 equipment requiring electrical connection
b. Fire protection plans

3. If intermediate submittal is necessary, process it in same manner as initial submittal.

4. Allow 15 days for processing each resubmittal.

5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.

3. Include the following information on label for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name and address of Contractor.
e. Name and address of Sub-Contractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Unique identifier, including revision number.
i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

G. Number of Copies:

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.

2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package submittals into binders or booklets. Submit plumbing and HVAC into separate binders or booklets.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

3. 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. Submittal and transmittal distribution record.
i. Remarks.
j. Signature of transmitter.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 - PRODUCTS

2.1 SUBMITTALS:

A. General: Prepare and submit Submittals required by individual Specification Sections.

1. Number of Copies: Submit 6 copies of each submittal, unless otherwise indicated. Engineer through Architect will return 5 copies. Mark up and retain one returned copy as a Project Record Document.

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 operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

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.

1. Preparation: 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.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-½ by 11 inches, but no larger than 30 by 40 inches.

4. Number of Copies: Submit one correctable, translucent, reproducible print and one black-line print of each submittal. Engineer through Architect will return the reproducible print.

5. Number of Copies: Submit 6 prints where prints are required for operation and maintenance manuals. Engineer and Architect will retain one print each; remainder will be returned.

D. Coordination Drawings:

1. Coordination drawings shall be prepared on sheets the same size as the contract drawings.

2. Number of submittal copies: Submit one reproducible copy of the coordination drawing. Engineer through Architect will return the reproducible.

3. Number of copies after approval: After approval, submit one black line copy of the coordination drawings for the record copy.

4. Refer to Division One for additional coordination requirements.

## PART 3 - EXECUTION

### 3.1 GENERAL:

A. Review of submittals by Engineer is to insure general quality conformance with the contract documents. The contractor assumes all responsibility for dimensions, quantities, conditions that pertain to the fabrication and installation, and for processes and techniques of construction.

B. Review of submittals or shop drawings by Engineer does not relieve Contractor of responsibility for errors or omissions during the submittal process. Submittal review does not relieve the contractor of any obligation in the contract documents.

C. Products of one manufacturer have been scheduled or specified as the basis of design. Any modifications to ductwork, piping, wiring, building structure, etc. that results from the use of any other products shall be coordinated by this contractor with all trades prior to delivery of approved product from the manufacturer. All modifications required shall be performed without incurring any additional cost to the Contract. Contractor shall document all modifications on the as-built record plans.

3.2 CONTRACTOR'S REVIEW:

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

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.

3.3 ENGINEER'S ACTION:

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved - Fabrication/Installation may be undertaken.
2. Approved as Noted - Fabrication/Installation may be undertaken.
3. Revise and Resubmit - Fabrication/Installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.
4. Rejected - Fabrication/Installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.

C. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

3.4 SUBMITTAL SCHEDULE:

A. See Attachment.

END OF SECTION 15015

## SECTION 15015 – ATTACHMENT

## SUBMITTAL SCHEDULE

15010 ..... Mechanical General

- ❑ Certificates of Inspection and Approval.
- ❑ Qualification of Superintendent.
- ❑ Warranties.
- ❑ List of proposed material manufacturers.
- ❑ Operating and Maintenance Manuals.
- ❑ Record as-built prints.
- ❑ Record electronic as-built drawings.

15015 ..... Mechanical Submittals

- ❑ N/A.

15050 ..... Basic Materials and Methods

- ❑ Access Panels
- ❑ Firestopping
- ❑ Sound stopping
- ❑ Pipe identification

15140 ..... Supports and Anchors

- ❑ Manufacturer's Data Sheets on all catalog items to be used.
- ❑ Sketches covering all specially designed assemblies and fabrications.
- ❑ Sketches showing:
  - ❑ Locations,
  - ❑ Loads,
  - ❑ Calculated travel,
  - ❑ Types and sizes of all spring hanger assemblies.
- ❑ Sketches covering all anchor and guide assemblies.

15241 ..... Seismic Restraints

- ❑ Manufacturer's data sheets on restraint hardware, mounting bolts and miscellaneous attachments, and installation details.
- ❑ A plan or isometric is required to locate all restraints, with a table indicating types, and seismic forces.
- ❑ Supporting calculations, calculations shall be stamped by a registered engineer.
- ❑ Manufacturer's literature on all hardware and materials.
- ❑ A field installation manual, which details for the installing tradesmen the material and installation techniques required.

15260 ..... Insulation (HVAC and Plumbing)

- ❑ Insulation
- ❑ Jacketing
- ❑ Tapes
- ❑ Hardware
- ❑ Mastics
- ❑ Adhesives

- ❑ Submittals shall use pages from Midwest Insulation Contractors Association - "Commercial and Industrial Insulation Standards" for defining how insulation materials will be applied.

15410 ..... Plumbing Piping

- ❑ Valves.
- ❑ Fittings.
- ❑ Test results for:
  - ❑ Pressure
  - ❑ Disinfection

15430 ..... Plumbing Specialties

- ❑ Manufacturer's literature indicating model numbers and options for:
  - ❑ Cleanouts
  - ❑ Water Hammer Arresters
  - ❑ Balancing Valves
  - ❑ Pressure Reducing Valves
  - ❑ Trap Seals
  - ❑ Floor Drains
  - ❑ Backflow Preventer
  - ❑ Wall Hydrants
  - ❑ Hose Bibbs
  - ❑ Thermostatic Mixing Valves

15440 ..... Plumbing Fixtures

- ❑ Manufacturer's data sheets and dimensional information on all fixtures and accessories.
- ❑ List of each component and accessory of the fixture, including manufacturer's model number.

15450 ..... Plumbing Equipment

- ❑ Water Heaters
  - ❑ Manufacturers Data Sheets
  - ❑ Certified Dimensional Drawings
- ❑ Identification number of each item, such as "WH-1 Water Heater", and a list of each component, accessories, and options.

15671 ..... Heat Pump Units

- ❑ Unit capacity
- ❑ Dimensions
- ❑ Power Requirements
- ❑ Connections
- ❑ Sound Power Level
- ❑ Control & Wiring Diagrams

15853 ..... Heat Pump Unit – Indoor Section

- ❑ Indoor Units:
  - ❑ Capacity.
  - ❑ Dimensional Information
  - ❑ Electrical Requirements
  - ❑ Filter.
- ❑ Outdoor Units:
  - ❑ Capacity.

- ❑ Dimensional Information.
- ❑ Electrical Requirements.
- ❑ Controls:
  - ❑ Manufacturer's Data Sheets,

15870 ..... Power Ventilators

- ❑ Dimensional information.
- ❑ Electrical connection and motor data.
- ❑ List of accessories or auxiliary items.
- ❑ Roof curb details and dimensions.
- ❑ Sound power levels at the mid frequency of each band.

15886 ..... Air Filters

- ❑ Manufacturer's literature.
- ❑ UL listing information.

15887 ..... Air Purification System

- ❑ Product Data for ion generators including:
  - ❑ Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
  - ❑ Data sheet for each type of plasma generator, and accessory furnished indicating:
    - ❑ construction,
    - ❑ sizes,
    - ❑ mounting details.
  - ❑ Performance data for each type of plasma device furnished.
  - ❑ Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air scheduled.
  - ❑ Product drawings detailing all physical, electrical and control requirements.
  - ❑ Copy of UL 867 independent ozone test.
- ❑ Operating & Maintenance Data:
  - ❑ Submit O&M data and recommended spare parts lists.

15892 ..... Low Pressure Ductwork

- ❑ Sheet Metal:
  - ❑ Gages by sizes.
  - ❑ ASTM Standards.
- ❑ Duct Fabrication Standards and Reinforcement:
  - ❑ Joint construction.
  - ❑ Fitting construction.
  - ❑ Joint and reinforcement spacing.
  - ❑ Splitter damper and duct tap details.
  - ❑ Flange details.
- ❑ Hangers:
  - ❑ Rods - sizes by duct.
  - ❑ Straps.
  - ❑ Trapeze.
  - ❑ Spacing.
- ❑ Duct sealers.
- ❑ Flexible connectors.
- ❑ Flexible ductwork.
- ❑ Dampers:

- ❑ Factory fabricated.
- ❑ Fire dampers.
- ❑ Damper hardware.

- ❑ Access doors.
- ❑ 1/4-inch scale shop drawings indicating location and mounting height of duct.
- ❑ Testing or listing certification, dimensional data and manufacturers literature on all manufactured products.

15906 ..... Temperature Controls

- ❑ Manufacturer's data sheets of all products (original copies).
- ❑ Fully labeled elementary diagram (electrical ladder diagram).

15936 ..... Registers, Grilles, and Diffusers

- ❑ Manufacturers technical literature for:
  - ❑ Performance.
  - ❑ Static pressure drop.
  - ❑ Throw.
  - ❑ Sound pressure loss (NC).
- ❑ Pictorial literature.

15990 ..... Testing, Adjusting, and Balancing

- ❑ 2 copies of evidence that the Testing, Adjusting, and Balancing Agent and this Project's Testing, Adjusting, and Balancing team members meet the qualifications specified in the "Quality Assurance" Article.
- ❑ 2 copies of the Contract Documents review report as specified in Part 3.
- ❑ 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- ❑ 8 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- ❑ 2 sets of sample testing, adjusting, and balancing report forms.
- ❑ 2 copies of special warranty specified in the "Warranty" Article.

SECTION 15050 - BASIC MATERIALS AND METHODS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. Provide equipment, labor, materials, etc. required to make a complete working installation as shown or as specified.

### 1.2 SUBMITTALS:

A. Provide submittals for:

1. Access panels
2. Firestopping
3. Sound stopping
4. Pipe identification

## PART 2 - PRODUCTS

### 2.1 CONCRETE HOUSEKEEPING PADS:

A. Concrete shall be 3000 psi at 28 days minimum.

### 2.2 ACCESS PANELS:

A. Access panels shall have welded steel frame, one piece doors, and self latching door locks.

B. Panels shall be Milcor, Cesco, Karp or prior approved equal. Milcor model numbers are cited as examples.

| Construction or Material Surface | Model No. |
|---|---|
| Fire rated walls or ceiling<br>1-1/2 Hr, B-Label<br>16 ga frame, 20 ga door | Fire Rated-Primer Finish |
| Drywall walls and ceilings<br>16 ga frame, 14 ga door panel | DW primer finish |
| Plaster walls and ceilings<br>16 ga frame, 14 ga door | K - primer finish |
| Masonry and Tile | M - primer finish<br>MS - stainless steel |

C. Locks: Standard locks shall be screw driver operated with case hardened steel cam. Cylinder lock shall be furnished in public spaces. Provide two keys per panel.

### 2.3 FIRESTOPPING AND SOUNDSTOPPING:

A. Firestopping materials shall conform to ASTM E 814 and E 119.

B. Penetration Sealants:

1. Flame Stop Distribution, Inc., Flame Stop V.

2. 3M Brand "Fire Barrier" CP 25 WB + Caulk

3. 3M Brand Moldable Putty "Pads" and Moldable Putty MPS-2 "Stix"

C. Intumescent Sealants for use in openings and sleeves involving plastic pipe, insulated pipe or flexible cable:

1. Flame Stop Distribution, Inc. Flame Stop VP with Retaining Fixture.

2. 3M Brand "Fire Barrier" Caulk, with FS-195 + Wrap Strip and CS-195 Composite Sheet.

D. Sound stopping material shall be .75 lb per cu. ft. density fiberglass.

E. Other acceptable manufacturer's include GE "Pensil", Dow Corning, Hilti.

2.4 MISCELLANEOUS STEEL:

A. ASTM A-36 Structural Steel

2.5 PIPE IDENTIFICATION:

A. Identification shall be in accordance with ANSI-A13.1. Pipe markers shall be Brady B-946 or Seton's Weather-Code.

2.6 PIPE SLEEVES:

A. Sleeves in concrete walls, floors or masonry - Sch 40 steel pipe, machine cut.

B. Sleeves in gypsum board or plaster walls - 14 gauge, rolled galvanized sheet metal. Tack welded on the longitudinal seam.

PART 3 - EXECUTION

3.1 CONCRETE HOUSEKEEPING PADS:

A. Provide concrete housekeeping pads under all floor mounted equipment, pipe support and duct supports and where indicated.

B. Housekeeping pads shall be not less than 3 ½ thick, sized at least 8 in. larger than the equipment.

C. Pads shall be doweled to floor with not less than 4 No. 4 bars grouted in place.

D. Pads shall have chamfered edges.

E. Pads shall receive a broom finish.

NOTE: Anchor bolts for equipment shall be poured integral with the pad.

F. Pads shall be reinforced with at least one No. 4 bar (stirrups).

3.2 ACCESS PANELS:

A. Provide access panels in walls and ceilings as needed to allow access to valves, equipment, shock absorbers, trap primers, etc. and where noted.

B. Access doors shall be selected for the type of wall or ceiling where needed. All locking access panels shall be keyed alike.

3.3 FIRE STOPPING AND SOUND STOPPING:

A. Provide penetrations for piping through floors and walls for work under this contract.

B. Penetrations through floors and fire resistant walls shall be sealed to the rated fire resistance equal to the wall. Installation shall be done by a qualified installer, approved by the manufacturer.

C. Provide sound proofing through non-rated walls.

D. In an existing building all penetrations through floors and fire resistant walls shall be sealed at the end of each working day. These closures shall have an equal fire resistance rating to the floor or wall.

3.4 CUTTING AND PATCHING:

A. Contractor shall be responsible for cutting and patching.

B. Cut walls, floors, ceilings, partitions, etc., required for the installation of this work in a neat and careful manner. Core drill for pipe sleeves and other openings through floors and walls. Sawcut larger openings. Cutting shall be kept to a minimum. Obtain approval of Architect before cutting or drilling.

C. Replace or repair ductwork, conduit, piping, etc., that is cut. Patch around opening cut by this Contractor or provided by others for him. Patching shall be done by an approved qualified contractor, but shall be paid for by this Contractor. Finished patching shall retain fire and smoke ratings of the assembly and shall match surrounding finish.

3.5 ANCHORS:

A. Mount all equipment, brackets, hangers, anchors, etc. to safely resist the vibration or thrust forces and support the unit's weight.

B. Floor mounted rotating or vibrating equipment shall be anchored to the floor using grouted-in-place or cast-in-place anchor bolts with three inch hook and sleeve. Anchor bolts shall be of the size recommended by the manufacturer.

C. Floor mounted static items, wall and ceiling mounted equipment bracket and hangers shall be installed using drilled anchors. Anchors shall be Phillips Drill Company "Red Head" or Multi-Set II. Size anchors for four times the applied load. Bolts used outdoors or in a wet environment shall be hot dip galvanized.

3.6 PIPE SLEEVES:

A. Provide pipe sleeves where pipes pass through floors and walls above or below ceilings. Provide pipe sleeves in new walls and floors as the work progresses. Provide split pipe sleeves in new walls built up around existing pipes. Tack weld split sleeves together.

B. Size pipe sleeves to allow continuous insulation, but not less than two pipe sizes larger than pipe.

C. Sleeves in walls shall be flush with wall, sleeves in floors shall extend 3/4 inches above floor and be flush with structure below.

3.7 PIPE IDENTIFICATION:

A. Provide pipe markers and directional arrows on pipes at both sides of partitions and floors slabs, at branch line take-offs, at valves, at intermediate intervals not in excess of 20 ft. and at connections to equipment.

B. Tape color band identifying markers and arrows on each pipe, both insulated and bare pipes. Pipe markers and arrows shall be located where readily visible and on lower quadrants of overhead pipes.

C. Submit schedule of pipe markers, with legend and background colors for approval by the Engineer.

3.8 EQUIPMENT IDENTIFICATION:

A. Identify each piece of equipment with a 1/8 inch thick engraved melamine plastic laminate nameplate. Letters shall be ½ inch high standard style. Names, abbreviations, and numbering shall agree with the corresponding equipment designations shown on the drawings. Use black letters cut in a white background for all equipment.

B. Fasten nameplates to equipment in a conspicuous location using self-tapping stainless steel screws, except use contact epoxy adhesive where screws cannot or should not penetrate substrate.

3.9 REFRIGERANT RECOVERY:

A. All work on refrigerant systems shall employ service techniques that prevent release of refrigerants to the atmosphere.

B. Remove all refrigerant. Place refrigerant in DOT approved containers for recycling/re-use.

3.10 WORKMANSHIP:

A. Pipe size changes shall be made at reducing fittings. Bushings shall not be used.

B. Provide drain valves at points where water is trapped in piping.

C. Install pipe to prevent noise or water hammer.

D. Blowout or flushout all lines prior to final connection or start-up, to remove foreign matter.

E. Make allowance in piping for expansion and contraction, for installation of insulation and to avoid air pockets.

F. Do not tap small pipes into larger pipes. Provide fittings or reinforced branch connections.

G. Cut pipes ends square, ream and de-burr. Cut threads clean and sharp. Pipe threads shall conform to ANSI B 2.1.

H. Pull up threaded fittings to a tight fit with an approved good quality pipe joint compound applied to male threads.

I. Inspect screwed joints for leakage and remake each joint that appears to be faulty. Do not wait for rust to form. Clean threads on both parts apply compound and remake joints.

J. Clean piping strainers after start-up by removing strainer screen and wire brushing.

K. Conceal pipes in pipe shafts, partitions and furred spaces except where otherwise distinctly indicated on the drawings. Each riser shall be separately valved.

L. Every branch pipe shall be controlled by a valve where it connects to the supply main or riser.

M. Valves shall be easily accessible, with proper clearance for maintenance. Valves inside furred spaces, behind access doors shall be grouped to keep the number of access doors and their sizes to a minimum.

N. Provide drain valves at the base of each riser.

O. Provide drain valves and drain lines from pumps, heaters, water cooled equipment, relief valves, etc., and pipe to floor drains.

P. Tighten flanges and packing glands after the system has been placed in operation. Replace gaskets in flanges that show any signs of leakage after tightening.

Q. Install NO piping in electrical switchgear room, transformer vaults, telephone rooms or electrical closets. Provide drip pans under drain piping above electrical switchgear in mechanical rooms.

R. Install piping in alignment with and parallel to the walls of the building. All risers shall be plumb.

S. No cross connections shall be installed between potable water systems and polluted supply or waste systems.

T. Provide valves and unions or flanges at equipment such as pumps, coils, tanks, automatic valves, heat exchangers, etc. Provide valves on capped branches for extension by other contractors.

U. Support piping at the proper intervals. Adjust pipe hangers and supports for correct pitch and alignment. Brace piping systems which sway.

V. Remove rust, scale, and foreign materials from equipment and renew any defaced surfaces. If equipment is marred, provide new materials.

W. Protect insulation. Repair insulation that is damaged. Keep it dry and free of tears. Allow no punctures in vapor barrier. Insure good tape adhesion. Provide smooth surfaces in finished areas.

X. Pitch sanitary and storm lines: pipes 3 in. and larger not less than 1/8 inch per foot, pipes 2 inch and smaller not less than 1/4 inch per foot. Make changes in grade or direction by "Y" branches.

Y. Pitch vent piping to free themselves of water and condensation. Install vent branches not less than 42 inches above floor. Clean fixtures of labels and stains with whiting and alcohol. Clean copper tubing and fittings with steel wool to remove traces of oxidation.

Z. Install ductwork to allow adequate clearance for maintenance. Locate fire dampers and access doors to allow replacement of fusible links. All dampers shall be accessible.

AA. All copper tubing shall be hard drawn unless noted otherwise. Annealed tubing where used shall be stretched, and installed with tool formed bends.

END OF SECTION 15050

SECTION 15140 - SUPPORTS AND ANCHORS

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the fabrication and installation requirements for equipment supports, pipe supports and brackets.

### 1.2 SUBMITTALS:

A. Submittals shall include the following information and data:

1. Manufacturer's Data Sheets on all catalog items to be used.

### 1.3 STANDARDS:

A. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.

| | | |
|---|---|---|
| B. | Standard SP-58 | Pipe Hangers and Supports-Materials, Design and Manufacture |
| C. | Standard SP-69 | Pipe Hangers and Supports-Selection and Application |
| D. | Standard SP-89 | Pipe Hangers and Supports-Fabrication and Installation Practices. |
| E. | Standard SP-90 | Guidelines on Terminology for Pipe Hangers and Supports |
| F. | ANSI/ASME B31 | Codes for Pressure Piping |
| G. | ASME | Boiler and Pressure Vessel Codes |
| H. | UL 203 | Standard for Pipe Hanger Equipment for Fire Protection Service |
| I. | WW-H-171E | Federal Specification, Hangers and Supports, Pipe |
| J. | AISC | Manual for Steel Construction |

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Hangers for suspending pipe 2-1/2 in. and larger shall be capable of vertical adjustment.

B. Steel and malleable iron hangers sized for copper tubing shall be copper plated.

C. Hangers, devices and hardware located outdoors shall be hot dip galvanized.

Horizontal Pipe Attachments: (PVC Pipe, and Copper Tubing larger than four inches) Type numbers as defined in MSS-SP-58

-- INDICATES NOT NORMALLY USED
X INDICATES ACCEPTABLE APPLICATION
NA INDICATES NON-ALLOWABLE

| TYPE 1<br><br>Adj. Steel Clevis Hanger | (INSULATED)<br>Hot Lines<br><br>X Note 1 | (UNINSULATED)<br>Ambient<br><br>X | (INSULATED)<br>Cold<br><br>X | FIRE PROTECT. U.L. LISTED | (UNINSULATED)<br>PLUMBING<br><br>X |
|---|---|---|---|---|---|
| TYPE 3 Double Bolt Pipe Clamp | NA | X | NA | X | X |
| TYPE 4 Steel Pipe Clamp | NA | X | NA | X | X |
| TYPE 5 Pipe Hanger | NA | NA | NA | NA | NA |
| TYPE 10 Adj. Swivel ring Band Type | NA | NA | NA | NA | NA |
| TYPE 36 Pipe Saddle Support | X Note 1 | X | X Note 1 | NA | X |
| TYPE 37 Pipe Stanchion Saddle | X Note 1 | X | X Note 1 | NA | X |
| TYPE 38 Adj. Pipe Saddle Suppor | X Note 1 | X | X Note 1 | NA | X |
| TYPE 41 Single Pipe Roll | X Note 3 | -- | X Note 1 | -- | -- |
| TYPE 43 Adj. Roller Hanger w/ Swivel | X Note 3 | -- | -- | -- | -- |
| TYPE 44 Pipe Roll Complete | X Note 3 | -- | -- | -- | -- |
| TYPE 45 Pipe Roll & Plate | X Note 3 | -- | -- | -- | -- |

| | | | | | |
|---|---|---|---|---|---|
| TYPE 46 Adj. Pipe Roll & Base | X Note 3 | -- | -- | -- | -- |

NOTE:
1. Hangers on insulated piping systems shall incorporate protection saddles or shields (MSS-SP-58).
2. The design shall be in accordance with MSS SP-58.
3. For shields used with rollers or subject to point loading, see table for Type 39 saddles (MSS SP-58).
4. Continuous inserts, anchor bolts and concrete fasteners may be used as specified by the Engineer.

Motion and Movement Control

| Item | MSS-SP-69 Type No. |
|---|---|
| Roller Hanger with Swivel | 43 |
| Pipe Roll | 44, 45, 46 |
| Restraint | 47 |
| Spring Cushion | 48 |
| Spring Cushion Roll | 49 |
| Spring Sway Brace | 50 |
| Variable Spring Hanger | 51 |
| Variable Spring Base Support | 52 |
| Variable Spring Trapeze Hanger | 53 |
| Constant Support-Horizontal | 54 |
| Constant Support Vertical | 55 |
| Constant Support Trapeze | 56 |
| Horizontal Traveler | 58 |

2.2 MISCELLANEOUS:

A. Hanger Rod - ASTM-A36 or A 575 Threaded Hot Rolled Steel

B. Upper Attachments

| Item | MSS SP 69 TYPE NO. |
|---|---|
| Side Beam or Channel Clamp | 20 |
| Center Beam | 21 |
| Welded Beam Attachment | 22 |
| C-Clamp | 23 |
| Top Beam Clamp | 25 |

Side Beam Clamp ..... 27

Steel Beam Clamp W/Eye Nut ..... 28

Linked Steel Clamp W/Eye Nut ..... 29

Welded Steel Bracket ..... 31, 32, 33

Side Beam Bracket ..... 34

2.3 STRUCTURAL STEEL:

A. All structural steel components used in the fabrication of supports, guides, etc. shall be ASTM A-36 or ASTM A 500 Grade A or B structural steel.

PART 3 - EXECUTION

3.1 GENERAL:

A. Repair/replace fire proofing on structural beams where it is removed or damaged for work under this section. Repair/replacement shall be done by an approved and qualified tradesman.

B. Drill for anchors in structural slabs and walls. Anchors shall be Phillips Drill Company "Red Head", or Multi-Set II. Hilti Fasteners, Rawlplug Company and Wej-it Corporation are approved equal. Powder actuated fasteners are prohibited.

C. Support piping independent of pumps, adjacent piping and equipment.

D. Structural supports shall be designed in accordance with AISC - Manual for Steel Construction. Support from the floor all horizontal piping with a centerline elevation less than four feet from the floor.

3.2 STRUCTURAL STEEL:

A. All steel framing, weldments and miscellaneous steel necessary for the installation of supports, etc. shall be designed in accordance with the AISC Steel Handbook. Steel shall be shop fabricated, furnished by the contractor. Steel shall receive one shop coat of primer.

B. Attach wall mounted pipe supports for exposed piping on dry wall construction to angle or channel supports framed into wall studs.

C. Support exposed piping on walls with split cast iron pipe holders.

D. Support piping systems by using standards manufactured hangers and supports wherever possible.

E. All pipe hangers and supports shall allow for the expansion and contraction of the piping systems.

3.3 VERTICAL:

A. Support vertical pipe at base and at each floor. In addition, 1 inch or smaller copper pipe shall be supported at 5 foot intervals.

B. Pipe support attachments to the riser piping shall be riser clamp lugs. Welded attachments shall be of material comparable to that of the pipe, and designed in accordance with governing codes.

C. Support vertical pipe independently of connected horizontal pipe. Use riser clamps which

extend beyond the insulation to support the weight of the pipe.

3.4 HORIZONTAL:

A. Use wall brackets to suspend or support pipe runs near walls. Hanger rods shall be used in tension only. Install rods plumb, limit rod travel to 4 degrees from vertical.

B. Multiple adjacent pipes at the same bottom-of-pipe elevation may be supported from Unistrut, Kindorf or B-Line channel trapeze hanger.

SUPPORT SPACING: HORIZONTAL PIPING SUPPORT SCHEDULE (Carbon Steel, Copper and PVC)

| | COPPER | | PVC | |
|---|---|---|---|---|
| NOMINAL PIPE SIZE TUBING O.D. (IN.) | SUPPORT SPACING (FT.) | ROD SIZE (IN.) | SUPPORT SPACING (FT.) | ROD SPACING (IN.) |
| Up to 1/2 | 5 | 3/8 | 3-1/2 | 3/8 |
| 3/4 | 6 | 3/8 | 4 | 3/8 |
| 1-1/4 | 7 | 3/8 | 5 | 3/8 |
| 1-1/2 | 8 | 3/8 | 5 | 3/8 |
| 2 | 8 | 3/8 | 5 | 3/8 |
| 2-1/2 | 9 | 1/2 | 6 | 1/2 |
| 3 | 10 | 1/2 | 6 | 1/2 |
| 4 | 12 | 1/2 | 6-1/2 | 1/2 |
| 6 | -- | -- | 7-1/2 | 5/8 |
| 8 | -- | -- | 8 | 3/4 |

END OF SECTION 15140

SECTION 15241 - VIBRATION ISOLATION AND SEISMIC/WIND RESTRAINTS FOR PLUMBING SYSTEMS

PART 1: GENERAL

1.1 WORK INCLUDED

A. This Section provides minimum acceptance requirements for vibration isolation and seismic/wind restraints for all plumbing equipment and piping. Acceptance is determined by the Engineer of Record.

B. The determination of seismic and wind restraints required for non-structural components described in this Division is delegated to a qualified design engineer (Delegated Design Engineer) as defined by this Section.

C. This Section includes requirements for horizontal and vertical pipe support systems, including pipe risers, that use products specified in this Section to provide vibration isolation and to control and accommodate changes in pipe length due to thermal changes.

1.2 QUALITY ASSURANCE

A. Unless otherwise directed by the local authority having jurisdiction, the following codes and standards will apply and take precedence over any perceived or real conflict with this Section:

1. International Building Code

2. International Plumbing Code

3. American Society of Civil Engineers Standard ASCE/SEI

B. Project specific design values shall be used for determining seismic and wind design forces based on the information on the structural drawings. The values below are provided for reference only for the purpose of coordinating with suppliers and other trades. If a conflict exists between these values and the structural drawings, the values on the structural drawings will prevail. Where project documents do not provide values necessary to determine design forces, the Delegated Design Engineer may use values substantiated through the governing building code(s) or the authority having jurisdiction and subject to review and approval by the Engineer of Record.

1. Risk Category: III

2. Seismic Design Category: **C**

3. Short-period Spectral Response Acceleration parameter ($S_{DS}$): 0.288

C. All vibration isolation and restraint products and associated engineering work shall be provided by one supplying manufacturer. Preferred manufacturer is Vibro-Acoustics. Alternate manufacturers must request and obtain written approval by the Engineer of Record for substitutions. Supplying manufacturer shall be a full member in good standing with the Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) as indicated on the association website: http://www.viscma.com/.

D. Isolation and restraint products shall be tested or analyzed for performance as appropriate and reports shall be made available to the Engineer of Record upon request.

E. All work to determine seismic and wind restraints shall be done by or under the direct supervision of a qualified professional engineer in responsible charge of the work acting as the Delegated Design Engineer. This Delegated Design Engineer must hold an active license in the state or province of the project.

F. The following guides may be used for supplemental information on typical seismic restraint installation practices. Where a conflict exists between the guides and these construction documents, the construction documents will preside.

1. Federal Emergency Management Agency (FEMA) manuals 412, *Installing Seismic Restraints for Mechanical Equipment* and 414, *Installing Seismic Restraints for Ductwork and Pipe.*

2. Sheet Metal and Air-conditioning Contractors' National Association's (SMACNA) *Seismic Restraint Manual Guidelines for Mechanical Systems, 3rd ed., 2008*

3. American Society for Heating, Refrigerating and Air-conditioning Engineers' (ASHRAE) *A Practical Guide to Seismic Restraint, 2nd ed.*

4. Manufacturers Standardization Society of the Valve and Fittings Industry MSS SP-127-2014a, *Bracing for Piping Systems, Seismic – Wind – Dynamic Design, Selection, and Application.*

1.3 SUBMITTALS

A. Provide a submittal report with cover page and summary that details the scope of supply along with project information. Submittals that include seismic and/or wind restraints or include pipe riser support systems shall be sealed per state or province requirements by the Delegated Design Engineer.

B. Provide calculations that indicate the applicable seismic and wind design forces for each non-structural component within the scope of work and that substantiate the selection of restraints and attachments, including anchorage to structure. Calculations must be project- and product-specific; generic calculations are not acceptable.

C. Provide submittal drawings for all products specified herein and as indicated and scheduled on the drawings. Submittals shall indicate product locations, installation instructions, and full compliance with the product specification in Part 2. Any deviation shall be specifically noted and subject to Engineer of Record approval. Submittals shall include product capacity, ratings, dimensions, placement, attachment, and anchorage requirements.

D. Provide summary reports of testing or analysis for any customized restraints, snubbers, and support structures such as equipment bases and roof curbs at Engineer of Record's request. The summary report shall indicate adequate capacity for the project design forces– including all gravity, wind, and seismic loads.

E. Provide a detailed submittal for pipe riser support systems as indicated in Part 3 of this Section or as shown on the Drawings that includes, as appropriate, initial load, initial deflection, change in deflection, and final load at all isolator and anchor support locations. Submittal shall indicate locations for all supports, anchors, expansion compensators, and guides.

PART 2: PRODUCTS

2.1 GENERAL:

A. Springs: All springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. All springs except internal booster springs shall have an outside diameter not less than 0.8 of the compressed height of the spring. Ends of springs shall be square and ground for stability. Laterally stable springs shall have $k_x/k_y$ ratios of at least 0.8. All springs shall be fully color-coded to indicate capacity – color striping is not considered adequate.

B. Rubber Components: All rubber components shall be made of Neoprene or EPDM. Rubber compound shall be suitable for outdoor use to withstand UV and ozone exposure. Mounts, pads, or hanger elements of different durometers within a series shall be color coded for easy identification. Load vs. deflection test data shall be available upon request for all main isolation components and bottom cups that are located under springs.

C. Corrosion Protection: All springs shall be powder-coated enamel. Hardware shall be zinc-plated. Isolator housings shall be galvanized, powder-coated enamel, or painted enamel for indoor use and hot-dip galvanized for indoor or outdoor use. Unless otherwise specified, stands, bases, brackets, anchors, guides, and steel frames shall be prime painted, zinc-plated, black oxide coated, painted enamel, or powder-coated enamel for indoor use and hot-dip galvanized for outdoor use.

D. Capacity Ratings: Products that are selected to withstand seismic and wind loads shall have their load capacities in all appropriate axes determined by testing in accordance with ANSI/ASHRAE 171 or through analyses or through an approved combination of both. Supporting test reports shall be made available upon request.

2.2 VIBRATION ISOLATORS:

A. Vibration Isolation Pads:

1. Type NP – Rubber pad type isolators, 7/8" (22 mm) minimum thickness molded from high strength compound with minimum 2,750 psi (19 MPa) tensile strength. Pads shall be color coded for capacity and sized to deflect 20% of the overall height (0.18" (4.5 mm) for 7/8" (22 mm) thick pad). Maximum allowable deflection is 25% of the overall height (0.22" (5.5 mm) for 7/8" (22 mm) thick pad). Pads shall allow for anchor bolts to be installed through them with or without clamping nuts and without altering the published load vs. deflection performance for a given size.

2. Type N – Rubber pad type isolators, 3/8" (10 mm) minimum thickness and ribbed on both sides. Pads shall be sized to deflect 20% of the overall height (0.07" (2 mm) for 3/8" (10 mm) thick pad).

Additional steel plates shall be furnished as required with pad type isolators either for stacking purposes to provide increased height or increased deflection, or for load distribution purposes. All layers shall be affixed together using appropriate glue or double sided tape to prevent delamination.

B. Grommet Washers: Type GW – Rubber grommet washers of sufficient size to accommodate USS standard washers, long enough to sleeve through 1/4" (6 mm) plate material, and with at least 1/8" (3 mm) thick material around bolt holes.

C. Rubber-in-Shear Floor Mounts: Type RD – "Double-deflection" rubber isolators, with rubber-coated metal surfaces, internal threaded holes for securing components, and bolt holes for securing to structure.

D. Restrained Rubber-in-Shear Floor Mounts: Type SRD – "Double-deflection" rubber isolators with mounting brackets and all-directional snubbers for seismic and wind restraint. Snubbers shall include elastomeric components to prevent metal-to-metal contact under normal operation and during a seismic or extreme wind event.

E. Free Spring Floor Mounted Isolators:

1. Type FS – Free-standing, laterally stable, unhoused spring isolators with vertical studs for supporting, leveling, and securing equipment. Springs shall be supported with rubber cups with steel inserts that can be bolted to structure.

2. Type FST – same as Type FS with the addition of top plates for supporting components.

F. Restrained Spring Floor Mounted Isolators:

1. Type CSR – Laterally stable, vertically restrained spring isolators with welded steel housings and heavy top plates for supporting components. Springs shall be supported with rubber cups with steel inserts. Housings shall include vertically restraining limit stops (hold-down plates). Minimum clearance between metal components before contact is made shall be 1/4" (6 mm). Top plates and restraining bolts shall be out of contact with housings during normal operation and rubber grommets shall be incorporated to minimize metal-to-metal contact.

2. Type SCSR – Laterally stable, restrained spring isolators with housings and heavy top plates for supporting components. Isolators shall be designed to withstand seismic and wind forces. Springs shall be supported with rubber cups with steel inserts. Housings shall be of welded high grade steel construction and include restraining limit stops (hold-down plates). Maximum clearance around restraining bolts shall be 1/4" (6 mm). Top plates and restraining bolts shall be out of contact with housings during normal operation and all-directional heavy duty snubbers shall be incorporated to minimize metal-to-metal contact. Isolators shall be furnished with factory installed oversized base plates for anchor load distribution purposes where required.

3. Type SFS – Laterally stable, restrained spring isolators with vertical studs for supporting and securing components. Springs shall be supported with rubber cups. Housings shall include integral all-directional limit stops and heavy duty snubbers preventing metal-to-metal contact and with minimum 1/4" (6 mm) clearance under normal operation.

G. Closed Mount Spring Isolators: Type CM – Floor mounted spring isolators with housings and telescoping equipment support plates with vertical studs for securing components. Springs shall be supported either with rubber cups or metal base plates complete with ribbed rubber pads, minimum 1/4" (6 mm) thick, bonded to base plates. Housings shall incorporate rubber stabilizers to minimize short circuiting and provide vertical damping.

H. Rubber Hangers: Type NH – "Double-deflection" rubber hanger isolators, complete with integral rubber sleeves through housing. Rubber elements shall be color-coded to identify load capacities and include either internal or external metal washers to prevent

pull-out failure. NH hangers shall be furnished with vertical uplift stop washers where used to support seismically restrained components.

I. Spring Hangers: Vibration isolator hanger supports with steel springs and welded steel housings. Hangers rated for loads above 200 lbs (0.9 kN) shall be designed for a minimum of 15 degree angular misalignment from vertical before support rod contacts housing. Spring hangers shall be furnished with vertical uplift stop washers where used to support seismically restrained components.

1. Type SH – Spring hanger isolators complete with springs, compression cups, and rubber washers. Pre-compressed versions shall include hardware to compress springs prior to installation and be shipped

2. Type SHR – Combination spring and rubber hanger isolators complete with springs, compression cups, and rubber "double-deflection" elements at top of hangers. Isolators rated for 2000 lbs (8.9 kN) and above may use Type NP pad isolators in place of double-deflection elements.

3. Type SHB – Spring hanger isolators with rubber bottom cups complete with springs, compression cups, and rubber cups under springs.

4. Type SHRB – Combination spring and rubber hanger isolators with rubber bottom cups complete with springs, compression cups, rubber "double-deflection" elements at top of hangers, and rubber cups under springs.

5. Pre-compressed versions (Types PSH, PSHR, PSHB, PSHRB) of each of the above spring hanger models shall include hardware to compress springs prior to installation and shall be shipped pre-compressed to 2/3 of rated load.

2.3 BASES:

A. Steel Equipment Base: Bases shall be constructed of structural steel members with cross members to form an integral support platform. Steel deflection shall be limited to 1/360$^{th}$ of the longest span but not to exceed 1/4" (6 mm). Minimum clearance under steel equipment bases shall be 1" (25 mm). Bases shall be designed for specific support points, both for the equipment on top and the support points below.

1. Type CTB – bases typically used for large equipment such as cooling towers and consisting of W-shaped structural steel beam main supports and cross bracing to create a rectangular base with bolted or welded joints. Bases shall include pre-drilled holes for attaching equipment. Bases shall be engineered for all design lateral loads as well as vertical loads. Design calculations shall be available upon request.

2. Type IFB – bases typically used for supporting small equipment such as fans and their associated motors with structural angle main support beams and cross braces.

B. Concrete Inertia Base: Inertia bases shall be of welded steel or formed sheetmetal construction with concrete in-fill supplied by the installing contractor on site and shall incorporate minimum #4 (or 10M) reinforcing bars, welded 12" (300 mm) to 18" (455 mm) maximum on centers each way. Inertia bases for end suction and split case pumps shall be of sufficient size to accommodate supports for pipe elbows at pump suction and discharge connections. The weight of each inertia base shall be at least equal to the weight of the equipment mounted thereon. Inertia bases shall be of minimum 6" (150

mm) thickness. Height-saving brackets or welded steel pockets shall be incorporated to ensure a 1-1/2" (40 mm) minimum clearance under each base. Equipment bolting templates shall be provided when required or scheduled. Bottom pans may be provided at contractor option but shall be minimum 16ga (1.6 mm) sheetmetal.

1. Type CIB – Rectangular frame concrete inertia base typically used with end suction pumps and other base-mounted equipment.

2. Type TCIB – T-Shaped frame concrete inertia base typically used with double suction pumps with suction and discharge piping supported on each side of the pump.

3. Type LCIB – L-Shaped frame concrete inertia base typically used with double suction pumps with suction piping supported on one side.

2.4 SEISMIC/WIND RESTRAINTS:

A. Cable Restraints:

1. Type BB – Preassembled, adjustable sway bracing restraints made with 7x19 galvanized steel aircraft cable, brackets or stake eyes, and thimbles sized to resist design loads and packaged together in pairs. Cable restraints shall use securement devices with set and locking screws that allow quick cable length adjustment to remove excessive sag.

2. Type BBR – Type BB restraints with one end complete with a hook-style bracket suitable for retrofit applications.

3. Type SRK – sway bracing restraints made with 7x19 wire rope using brackets, thimbles, and wire rope clips for securement devices. Where restraints are exposed to corrosive environments they shall be made with stainless steel materials.

B. Rigid Restraints: Type RRK – rigid sway bracing restraints made with lengths of standard 1-5/8" (41 mm) square strut and heavy duty brackets made of high-strength, low alloy steel. Brackets shall be of a universal design for attachment to both structure and restrained component and shall accommodate retrofit installation.

C. Beam Clamps: Type BC – Seismically rated beam clamps for attachment of restraints to structural steel without drilling. Beam clamps shall be constructed of ductile cast frames, case hardened cone point set screws and related hardware.

D. Hanger Rod Stiffener Clamps: Type VAC – Formed steel clamps used to secure structural angles to threaded rod supports complete with securing bolts and locking nuts.

E. Support Stands:

1. Type SIPS – trapezoidal-shaped rigid support stands made of high strength, low alloy steel designed to be bolted to pipe flanges which support vertical inline pumps and other flanged components. Stands shall include cut-outs to accommodate pump body gussets and rubber grommet washers preinstalled in mounting holes for anchor bolts.

2. Type SIPS-NP – Type SIPS stands complete with vibration isolation pads for reducing vibration transmission into the supporting structure.

3. Type SPS – rigid support stands made with round hollow steel sections, designed to support pipe weight and withstand lateral seismic forces.

4. Type SPSA – rigid support stands made with round hollow steel pipe or sections, designed with an adjustable element to accommodate different pipe sizes and elevations.

F. Brackets and Snubbers:

1. Type SRB – Formed steel brackets for securing floor-mounted equipment complete with pre-drilled holes. Brackets shall be furnished with grommet washers for vibration isolated equipment and shall be painted enamel or powder-coated enamel for indoor or outdoor use.

2. Type DAB – Formed steel brackets that allow use of two anchors to secure sway bracing restraints to structure. Brackets shall be designed for use with wood, monolithic concrete, and concrete on metal deck installations – both B-deck and W-deck versions shall be available.

3. Snubbers: Structural steel shapes with contact surfaces covered with rubber to cushion impact forces. Snubbers shall be designed to limit excessive vibration isolated equipment motion due to wind or seismic loads to no more than 1/4" (6 mm) in any direction.

G. Anchor Bolts:

1. Post-installed anchor bolts in concrete and masonry shall be qualified for seismic/wind restraint applications as appropriate.

2. Mechanical anchor bolts: Concrete screw type, drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Anchor bolts shall be tested and qualified for use in accordance with ACI 355.2 and ICC-ES AC193.

3. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Anchor bolts shall be tested and qualified for use in accordance with ACI 355.4 and ICC-ES AC308.

2.5 FLEXIBLE CONNECTORS AND EXPANSION JOINTS:

A. Rubber Expansion Joints: Synthetic rubber tube and cover construction, molded and cured in hydraulic presses using either EPDM (Type EJE) or neoprene (Type EJN) as specified or as required by the application. Rubber expansion joints shall be reinforced with multi-ply Nylon tire cord fabric; internal reinforcing of metal wire or embedded rings are not acceptable. Rubber expansion joints shall either be single sphere (EJE1 OR EJN1) or double sphere (EJE2 OR EJN2) as specified or as required by the application. Double sphere rubber expansion joints shall have a factory installed steel body ring between the two spheres to control ballooning under high pressure/temperature situations. Rubber expansion joints for pipe sizes 1-1/2" (40 mm) and up will have floating steel flanges. The mating surface will be 100% rubber. For sizes 3/4" (20 mm) up to 3" (80 mm), threaded female union connectors are also accepted. Control rods or cables

shall be installed to prevent excessive elongation where required. Control rods shall utilize 1/4" (6 mm) thick rubber grommets to limit vibration transfer.

B. Metal Bellows Expansion Joints: Type EJM – Bellow pump connectors with series 300 stainless steel multi-ply bellows construction welded to carbon steel flanges. Metal bellows expansion joints shall have three factory installed tie rods to prevent excessive elongation, and to control the static pressure thrust at full rated working pressure of the connector. Tie rods shall utilize rubber grommets to limit vibration transfer.

C. Braided Metal Flexible Connectors: Corrugated 300 series stainless steel bellows (Type FCSS) or bronze bellows (Type FCB) flexible connectors with stainless steel or bronze braiding connected to braid collars and pipe fittings at each end.

D. Thermal and Seismic V-Connectors: Combination of two braided flexible connectors with stainless steel bellows and braids (Type SBS) or bronze bellows and braids (Type SBV), two 45° elbows and one 90° elbow configured in a V-shape layout for a total of 180° in pipe connection change. V-connectors shall allow movements as required by the application and of at least 2" (50 mm) along the 6 directions of XY, YZ and XZ planes. Large connectors shall be supplied with shipping bars tack welded at factory to maintain designed length before installation. For steam applications, a drain port and plug shall be specified and factory installed into the bottom of the 90° elbow to allow condensate to be drained.

E. Thermal Expansion Compensators: Type TEC – Thermal expansion compensators, constructed with two–ply series 300 stainless steel bellows and carbon steel shroud, internal liner and end fittings. Expansion compensators shall utilize anti-torque, anti-squirm devices and allow axial movements of 1-3/4" (44 mm) compression and 1/4" (6 mm) extension. In all applications, the compensator shall provide a minimum of 150% expected growth between anchors. Expansion compensator ends shall match piping connection methods.

F. Externally Pressurized Expansion Joints: Type XPEJ – Externally pressurized expansion joints, constructed using series 300 stainless steel formed bellows, external housing and pipe fittings. The externally pressurized expansion joints shall be rated to match the piping system and allow at least 4" (100 mm) of axial travel. Drain port and plug shall be provided factory installed where required.

2.6 ANCHORS AND GUIDES:

A. Spider Pipe Guides: Type SPG – Standard concentric spider type pipe alignment guides with heavy steel construction of sufficient strength to withstand lateral forces of at least 15% of calculated pipe anchor loads. Spider pipe guides shall provide space for specified insulation thickness and allow a minimum of 4" (100 mm) of axial movement (+/- 2" (50 mm)). For copper piping installations, dielectric spacers shall be furnished to prevent galvanic corrosion.

B. Pipe Riser Guides: Type PRG – Vertical sliding pipe riser alignment guides constructed with hollow structural shapes and welded steel plates and including rubber bushings between telescoping elements to eliminate metal-to-metal contact and minimize structure-borne noise transmission. Guides shall include support plates to accommodate attachment of pipe riser clamps or support brackets by welding or bolting. Guides shall be designed to be used in pairs with each associated pipe riser and accommodate vertical movement of at least 1-1/2" (38 mm) upwards or downwards from initial installed position.

C. Pipe Riser Anchors: Type PRA – All-directional pipe riser anchor resilient supports constructed with welded formed steel plate and including heavy duty rubber bushings to eliminate metal-to-metal contact and minimize structure-borne noise transmission. Anchors shall include support plates to accommodate attachment of pipe riser clamps or support brackets by welding or bolting. Anchors shall be designed to be used in pairs with each associated pipe riser and limit movement to less than 1/4" (6 mm) in any direction.

PART 3: EXECUTION

3.1 GENERAL:

A. Coordinate size, doweling, and reinforcing of concrete equipment housekeeping pads and piers with vibration isolation and restraint manufacturer to ensure adequate space and prevent edge breakout failures. Pads and piers must be adequately doweled in to structural slab.

B. Coordinate locations and sizes of structural supports for systems and equipment with locations of anchors, guides, stands, curbs, vibration isolators, and restraints.

C. Isolated and restrained equipment and piping located on roofs must be attached to the structure. Intermediate supports between the restraint points that are not attached to the structure must be coordinated with the restraint manufacturer.

D. Coordinate project material requirements with isolation and restraints supplier, e.g., use stainless steel components or hot-dipped galvanized products where required.

3.2 VIBRATION ISOLATION:

A. Block and shim all bases level so that all piping and electrical connections can be made to a rigid system at the proper operating level before isolators are adjusted. Ensure that there are no rigid connections or incidental physical contacts between isolated equipment and the building structure or nearby systems.

B. Select and locate vibration isolators to provide similar loading and deflection, according to weight distribution of equipment.

C. Secure base-mounted pumps and equipment, as indicated in this Section or on the drawings, to concrete-filled inertia bases. Concrete in-fill shall be supplied by the installing contractor on site.

D. Coordinate materials and connection styles for inline flexible connectors and expansion joints with isolation supplier, e.g., ANSI B16.5 Class 150 steel flanges for flanged pipe connections.

E. Types and Extent of Piping Isolation:

1. Isolate all piping larger than 1" nominal diameter rigidly connected to vibration isolated equipment with 1" static deflection spring isolators, except as described below, at spacing intervals in accordance with the following:

| Pipe Diameter | Distance from Vibrating Equipment |
|---|---|
| 1-1/4" to 4" | 50' |
| 6" | 60' |
| 10" and larger | 70' |

a. Horizontal: Floor supports for piping shall incorporate restrained spring floor isolators appropriate for the applicable design forces. Suspended piping shall be supported with Type SHR isolators, or PSHR at contractor option. The first 3 isolators shall be selected with the same nominal static deflection as the equipment isolators, but no greater than a nominal 2" deflection. The remaining isolators shall be selected with a nominal 1" static deflection.

b. Vertical: Piping shall be isolated from the supporting structure with spring floor isolators or spring and rubber isolator hangers selected with a nominal 1" static deflection.

2. Spring hanger isolators shall be cut in to the hanger rods and installed after the associated piping system is filled or other provisions must be made to ensure piping does not change height significantly during installation and start-up. Contractor may choose at their option to use precompressed spring hangers (i.e., Type PSHR) to enable installation prior to filling pipe systems.

3. Exemptions: Piping attached to isolated equipment with double sphere rubber expansion joints or flexible metal hose with minimum length equal to 10 pipe diameters, or to air handling units with internal vibration isolators meeting the requirements of these specifications is exempt from these requirements unless otherwise specified or indicated on the drawings.

F. Equipment Isolation: **See schedules on drawings.**

G. Installing contractor shall ensure no rigid contact of isolated piping or equipment with other structure, building systems, or components such as shaft walls, floor slabs, partitions, or conduits.

H. Provide height-saving brackets (HSB) where specified for equipment stability or operating height requirements.

I. Where recommended by the manufacturer or required for restraint, floor mounted isolators shall be bolted to the supporting structure.

J. Isolator hangers shall be installed with the housing a minimum of 1/4" below but as close to the structure as possible. Where isolator hangers would be concealed by non-accessible acoustical sub ceiling, install the hangers immediately below the sub ceiling for access.

3.3 SEISMIC/WIND RESTRAINTS:

A. General:

1. All equipment and piping shall be restrained to resist seismic/wind forces as required by and in accordance with the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds or any other qualified fastening methods. Friction shall not be considered as positive attachment. All attachments shall be proven capable of accepting the required wind and seismic loads by testing or analysis.

2. Install seismic and wind restraints per the Delegated Design Engineer and manufacturer's submittals. Any deviation from the manufacturer's instructions

shall be reviewed and approved by the manufacturer and the Delegated Design Engineer.

3. Attachment to structure for all restraints shall be as specified by the Delegated Design Engineer. Any changes or modifications shall be reviewed and approved by this engineer prior to installation or submission to the local authority.

4. Coordinate sizes and locations of cast-in-place inserts for attaching restraints to post-tensioned slabs with the restraint manufacturer and the Delegated Design Engineer.

5. Provide hanger rod stiffeners where indicated or as required by the Delegated Design Engineer to prevent buckling of threaded hanger rods due to uplift caused by design forces.

6. Where rigid restraints are used on equipment or piping components, the associated component support rods must be attached to structure with anchors rated for seismic use.

7. Install restraint cables so they do not bend across edges of adjacent components or building structure.

B. Concrete Anchors:

1. Follow all installation instructions and requirements as provided by anchor manufacturer. Use certified installers where required by anchor manufacturer.

2. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid any embedded items such as pre- or post-tensioned tendons, electrical and telecommunications conduit, and gas lines.

3. Do not drill holes in concrete or masonry for installing anchors until concrete, mortar, or grout has achieved full design strength.

4. Install rubber grommet washers on equipment anchor bolts or fill empty annular space with epoxy where clearance between anchors and equipment support holes exceeds 1/4".

5. Mechanical Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is fastened.

6. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

7. Set anchors to manufacturer's recommended torque, using a torque wrench.

C. Equipment Restraints:

1. Restrain equipment as required by the Delegated Design Engineer. Install fasteners, straps, restraints, and brackets as required to secure equipment.

2. Install snubbers on equipment supported by floor-mounted vibration isolators that are not rated for the applicable lateral design forces. Locate snubbers as close as possible to vibration isolators and attach to both equipment or its base and to supporting structure as required.

D. Piping Systems:

1. Restraint spacing where required:

a. For ductile piping, space transverse supports a maximum of 40' o.c., and longitudinal supports a maximum of 80' o.c.

b. For non-ductile piping (e.g., cast iron, PVC) space transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.

c. For piping with hazardous material inside (e.g., natural gas, medical gas) space transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.

d. For vertical pipe risers, restrain the piping at floor penetrations using the same spacing requirements as above.

2. Longitudinal restraints for single pipe supports shall be attached directly to the pipe, not to the pipe hanger.

3. For supports with multiple pipes (e.g., trapezes), secure pipes to supporting member with clamps approved for application.

4. Piping on roller supports shall include a second roller support located on top of the pipe at each restraint location to provide vertical restraint. At the discretion of the Delegated Design Engineer, oversized U-bolts or other means may be used in lieu of a second roller.

5. Install thermal and seismic V-connectors in piping which crosses building seismic joints, sized for the anticipated amount of movement.

6. Install flexible piping connectors where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.

7. Coordinate restraints with thermal expansion compensators, guides and anchor points. Thermal expansion anchor points shall be designed to accommodate seismic forces.

3.4 INSPECTION AND CERTIFICATION:

A. After installation, arrange and pay for the vibration isolation product manufacturer, or representative, to visit the site to verify that the vibration isolation systems are installed and operating properly, and to submit a letter so stating. At a minimum, verify that isolators are properly adjusted, with springs perpendicular to bases or housing,

adjustment bolts are tightened on equipment mountings, and hanger rods are not in contact with hanger isolator housings.

B. After installation, arrange and pay for the restraint product manufacturer, or representative and/or the Delegated Design Engineer or their representative to visit the site to verify that the restraint systems are installed properly, and to submit a letter so stating. The letter shall be sealed and signed by the Delegated Design Engineer.

C. Any deficiencies identified shall be corrected by the installing contractor until accepted by the Engineer of Record or Delegated Design Engineer as appropriate. Corrective work shall be in compliance with applicable building codes and this specification and construction documents or reasonable equivalent.

END OF SECTION 15241

SECTION 15260 - INSULATION (HVAC & PLUMBING)

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. All work covered in this section consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to the following systems, piping, equipment, and ductwork.

### 1.2 DEFINITIONS:

A. Exposed piping and ductwork is that which can be seen when the building is complete without opening or removing access door panels, or ceilings tiles. This also includes all mechanical equipment rooms and pipe tunnels.

B. Concealed piping and ductwork are those elements above ceilings, in chases, interstitial space and pipe spaces. Other piping and ductwork is considered to be exposed.

C. Exterior piping and ductwork is that which is exposed to the weather and/or outside the building envelope. Piping and ductwork protected by overhangs, areaways, etc., exterior to the building envelope are considered exterior.

D. ASJ: All service jacket, white finish facing or jacket.

E. Air conditioned space: Space directly supplied with heated or cooled air.

F. Cold: Equipment, ductwork or piping handling media at design temperature of 60 degrees F or below.

G. FRK: Foil reinforced kraft facing.

H. FSK: Foil-scrim-kraft facing.

I. Hot: Ductwork handling air at design temperature above 60 degrees F; equipment or piping handling media above 105 degrees F.

J. Pcf: Density, pounds per cubic foot.

K. Runout: Branch pipe connection up to one inch nominal size to a one terminal piece of equipment (fan coil, terminal box).

L. Thermal conductance: Heat flow rate through materials.

1. Flat surface: BTU per hour per square foot.

2. Pipe or cylinder: BTU per hour per linear foot.

3. Thermal conductivity (k): BTU per inch thickness, per hour, per square foot, per degree Fahrenheit temperature difference.

### 1.3 QUALITY ASSURANCE:

A. Products of the manufacturers, herein, will be acceptable for use for the specific functions

noted. All materials shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such materials in either the wet or dry state.

B. Materials shall be applied subject to their temperature limits. Any methods of application of insulation materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.

C. Insulation shall be applied by experienced workers regularly employed for this type work.

1.4 RATING:

A. All insulation shall have composite surface burning characteristic rating as tested by ASTM E 84, UL 723, or NFPA 255 not exceeding:

| | |
|---|---|
| Flame Spread | 25 |
| Smoke Developed | 50 |

B. Composite shall include insulation, jacketing and adhesive used to secure jacketing or facing. All accessory items such as PVC jacketing and fittings, adhesive, mastic, cement, tape and cloth shall have the same component rating as specified above.

1.5 STANDARDS:

A. ANSI/ASHRAE Standard 90.1 Energy Standard for Buildings Except Low-rise Residential Buildings.

B. Midwest Insulation Contractors Association "Commercial and Industrial Insulation Standards" - Third Edition.

1.6 SUBMITTALS:

A. Submittals shall include all materials used, including:

1. Insulation
2. Jacketing
3. Tapes
4. Hardware
5. Mastics
6. Adhesives

B. Submittals shall be formatted to include a list of materials for each service:

C. Submittals shall use pages from Midwest Insulation Contractors Association - "Commercial and Industrial Insulation Standards" for defining how insulation materials will be applied.

PART 2 - PRODUCTS

2.1 GLASS FIBER INSULATION:

A. Piping:

1. Nominal minimum thicknesses are listed in the table at the end of this section. These thicknesses are based on insulation having a thermal resistivity between 4.0 to 4.6 sq. ft.-hr.-F/BTU-in. on a flat surface resistivity to maintain equivalent insulation

value.

2. Insulation shall be 850 deg. F rated as manufactured by Owens Corning, Manville or Knauf.

3. Insulation shall have factory-applied, reinforced, flame retardant, vapor barrier jacket equal to Owens-Corning ASJ with selfsealing lap. Butt joints shall be taped with field-applied ASJ tape 3 in. wide.

4. Refer to the table at the end of this section for required pipe insulation thicknesses.

5. Routed or molded fitting insulation shall be Hamfab.

B. Ductwork (Insulation):

1. Insulation shall be 250 deg. F rated as manufactured by Owens Corning, Manville, Knauf, or Certainteed.

2. Duct Wrap: 1.0 PCF with aluminum or FRK facing, having a maximum vapor transmission of .02 perms.

2.2 ELASTOMERIC CLOSED CELL INSULATION:

A. Tubing and Sheet:

1. Flexible fire retardant closed cell, conforming to ASTM C 534, and ASTM 1056. Thermal resistivity shall be 3.70 sq.ft.-hr-F/BTU-in. Insulation shall be Rubatex or Armaflex.

2.3 FINISHES:

A. Metal jacketing, smooth .016 in. thick, type T 3003 aluminum with laminated moisture barrier. Jacketing shall be Childers, aluminum roll jacketing with Polykraft moisture barrier. Jacketing shall be embossed "No Asbestos" on a 6 inch spacing.

B. Metal fitting covers shall be two piece aluminum. Covers shall be Ell-Jac.

C. Foil scrim kraft (FSK) jacket, flame retardant vapor barrier. Jacket shall be Alpha Temp 10651, all service jacket.

D. Fitting covers shall be one piece 20 mil PVC, covers shall be Ceel-Tite 550 PVC-UVR by Ceel-Co. Zeston and Proto are approved equals.

E. Water based latex enamel equal to Armstrong WB Armaflex Finish.

2.4 MISCELLANEOUS:

A. Adhesives:

1. Glass & Mineral Fiber - Foster 85-20 / Vimasco 795.
2. Cellular Glass - Pittcote 300 / Childers CP-30.

B. Mastic (Weather Barrier):

1. Foster 35-00 Mastic / Vimasco.
2. Childers Vi-Cryl CP10/11.
3. Vimasco WC-5.

C. Coatings:

1. Foster - Monolar Coating / Vimasco
2. Foster Sealfas 30-36 / Vimasco
3. Foster Tite-Fit 30-56 / Vimasco
4. Pittcote 300

D. Vapor Barrier Sealant: Foster Flextra 95-50

E. FSK tape 3 in. wide, equal to Nashua FSK.

F. Insulpins

G. Roll on Corner bead (2 in. x 2 in., 26 ga. galvanized steel).

H. Fiber reinforced tape - Nashua 357, or 398.

I. Insulation protection shields - Grinnell fig 167.

J. Rigid insulation inserts - Hamfab.

K. Reinforcing Cloth - Vimasco, Elastafab 894, conforming to ASTM D1668.

L. Bands - .020 in., aluminum, ½ in. wide, embossed continuously with the legend "No Asbestos".

M. Hexagonal Wire Netting - One inch mesh, 22 ga. galvanized steel.

PART 3 - EXECUTION

3.1 GENERAL:

A. Insulation shall be applied to clean and dry surfaces after tests and approvals required by this specification have been completed.

B. On cold surfaces where a vapor barrier must be maintained, insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

D. All pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.

E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required.

F. Size insulation to cover electric heat tracing on piping where it is specified.

G. All clevis type pipe supports shall be sized to fit the outside diameter of the insulation.

H. Insulate valves, fittings, flanges etc. with the same thickness of insulation as specified for piping.

I. Install longitudinal jacketing laps to shed rainwater.

J. Insulate items mounted in ductwork with the same thickness of insulation as specified for ductwork: including air measuring stations, smoke dampers, and automatic dampers.

K. Repair insulation damaged by work under this contract to match existing work or replace damaged portion with insulation specified for new work.

L. Standing seams and other projections in ductwork or casings shall have insulation applied so that at least ½" of insulation will cover such projections.

M. Where ductwork is lined, no thermal insulation is required.

N. Where unlined duct and lined duct connect, the insulation shall overlap lined section at least 6".

O. Piping and ductwork covered with metal or P.V.C. jacketing systems shall have the joints made to shed water. Laps shall be positioned in the bottom quadrant on horizontal pipe and ductwork.

3.2 HVAC SYSTEMS:

A. Concealed Ductwork:

1. Apply jacketed ductwrap to all concealed ductwork providing conditioned air, or outside air. Insulate return ductwork in non-conditioned spaces and in ceiling spaces below a roof.

2. Pull insulation snug, but do not compress insulation more than 1/4 inch.

3. Secure ductwrap insulation to ductwork using adhesive. Secure insulation on bottom on sides of horizontal ductwork and all sides of vertical ductwork with insulpins welded to duct on 12 to 18 inch centers and with clips slipped over the pins. Apply clips without compressing insulation. Make joints by lapping the facing a minimum of 2 inch and stapling with T-5 flared staples. Vapor - seal with Childers CP-30 Low Odor at all staples, clip locations and other penetrations. Seal joints with 3 inch wide FSK tape.

4. See schedule at end of this section for insulation thicknesses.

B. Elastomeric:

1. Apply closed cell elastomeric insulation to all pipes, equipment and surfaces listed below.

2. Secure insulation with contact adhesive in accordance with manufacturers instructions.

3. Insulate fittings and valves with miter cut pieces of insulation same thickness as piping.

4. DX Systems:

   a. Apply one layer of 1 inch thick elastomeric closed cell tubular insulation to the refrigerant suction line, and the refrigerant liquid line after the expansion valve.

5. Cooling coil condensate piping - 1 in. thick

6. Covers and caps for all valve stems and operators, gauge cocks, thermometer wells and other appurtenances subject to sweating.

C. Finishes:

1. Metal Jacketing (Aluminum):

   a. Cover the following insulated systems with metal jacketing:

      (1) Piping installed outdoors
      (2) Exposed piping indoors within 8 ft. of finished floor

   b. Cover with .016 in. thick aluminum jacket and hold in place with 2 in. wide aluminum bands on 9 in. centers. Fittings shall be covered with mitered segments of jackets or two piece preformed fitting covers. Provide angle ring escutcheons at wall, ceiling or floor penetrations.

   c. Machine cut the jacket to produce a straight, smooth edge. Lap longitudinal and circumferential seams not less than 2 in. Install jackets on horizontal piping with the longitudinal seam approximately midway between horizontal centerline and the bottom side of pipe. Install with the top edge of jacket overlapping the bottom edge of jacket and with the seam of each jacket slightly offset from the seam of the adjacent jacket. Install jackets on vertical piping and on piping pitched from the horizontal from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it.

2. Metal Jacketing (Galvanized):

   a. Insulated ductwork installed outdoors, insulated ductwork within 8 ft. of the finished floor in a mechanical room shall be covered with 30 gauge galvanized steel. Covering shall be hemmed, and flanged. Secure with self tapping screws on eight inch centers. Do not puncture vapor barrier.

3. All Service Jacket/fitting Covers:

   a. Exposed piping finish covering indoors shall be the All Service Jacket. Fittings shall be covered with molded fitting covers.

   b. Concealed Piping finish covering shall be the All Service Jacket. Fittings shall be covered by wrapping the fitting with fiber reinforced tape, with a 5 percent overlap.

c. Pipe fittings larger than cataloged aluminum two piece or PVC covers shall be covered with vapor barriers mastic for cold lines, or two layers of hydraulic cement reinforced with wire mesh and finished with vinyl acrylic weather barrier mastic.

4. Paint:

a. Exposed or exterior installations of elastomeric closed cell insulation shall be painted with two coats of water base latex enamel.

3.3 PLUMBING SYSTEMS:

A. Domestic Water Piping:

1. See schedule at the end of the section for thickness.

2. Each section of insulation shall be firmly butted and secured with ASJ or SSL butt strips a minimum 3 inches wide. ASJ jacket laps and butt strips shall be secured with outward clinch staples at 4 inch spacing (hot piping only).

3. All fittings and valves shall be insulated with preformed fiber glass fittings or mitered sections of pipe insulation. Insulation shall be of equal thickness to the adjacent pipe insulation.

4. Insulate flanges and unions ![on electric traced piping] with insulation of same thickness as specified for pipe connected to flanges. Do not insulate flanges and unions or low temperature (below 120 deg. F) water systems.

5. Provide rigid insulation inserts per manufacturer's recommendations at each support.

6. Provide insulation shield at each support.

7. Provide removable insulation sections equal in thickness to pipe covering.

B. Cold Piping (Cellular Glass Only):

1. Insulate horizontal rain leaders (normal and emergency) in ceiling plenums.

2. Thickness:

a. All sizes - 1-1/2 inch thick.

3. The insulation shall be applied with all joints buttered full depth with mastic or joint sealant. The insulation sections shall be staggered and tightly butted together, except at contraction joints. Use ½" x 0.015" aluminum bands 12" on center. The mastic or joint sealant shall be white in color.

4. Insulation for fittings, valves, and flanges shall be sized to match adjacent straight run pipe insulation and fabricated from cellular glass. All joints shall be sealed as above. Large voids between the insulation and fitting shall be filled with a polyurethane foam.

5. Insulation shall be covered with field or factory applied All Service Jackets. Overlap

on the longitudinal seams shall be sealed with vapor seal adhesive and stapled. Overlap jacket along pipe length and seal with adhesive.

6. Provide at each support a curved insulation protection shield.

7. Cover each staple with vapor seal mastic.

C. Elastomeric:

1. Apply closed cell elastomeric insulation to all pipes, equipment and surfaces listed below.

2. Secure insulation with contact adhesive in accordance with manufacturers instructions.

3. Insulate fittings and valves with miter cut pieces of insulation same thickness as piping.

4. Insulated surfaces:

a. Waste piping from electric cooler - 1 in. thick.

b. Cooling coil condensate piping - 1 in. thick.

c. Covers and caps for all valve stems and operators, gauge cocks, thermometer wells and other appurtenances subject to sweating.

D. Finishes:

1. All Service Jacket/fitting Covers:

a. Exposed insulated piping indoors not scheduled for painting shall be covered with an All Service Jacket. Fittings shall be covered with molded fitting covers.

b. Concealed Piping finish covering shall be the All Service Jacket. Fittings shall be covered by wrapping the fitting with fiber reinforced tape, with a 5 percent overlap.

c. Pipe fittings larger than cataloged aluminum two piece or PVC covers shall be covered with vapor barrier mastic for cold lines for hot lines, or two layers of hydraulic cement reinforced with wire mesh and finished with vinyl acrylic weather barrier mastic shall be used.

2. Metal Jacketing (Aluminum):

a. Cover the following insulated systems with metal jacketing:

(1) Piping installed outdoors
(2) Exposed piping indoors within 8 ft. of finished floor

b. Cover with .016 in. thick aluminum jacket and hold in place with 2 in. wide aluminum bands on 9 in. centers. Fittings shall be covered with mitered segments of jackets or two piece preformed fitting covers. Provide angle

ring escutcheons at wall, ceiling or floor penetrations.

c. Machine cut the jacket to produce a straight, smooth edge. Lap longitudinal and circumferential seams not less than 2 in. Install jackets on horizontal piping with the longitudinal seam approximately midway between horizontal centerline and the bottom side of pipe. Install with the top edge of jacket overlapping the bottom edge of jacket and with the seam of each jacket slightly offset from the seam of the adjacent jacket. Install jackets on vertical piping and on piping pitched from the horizontal from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it.

3. Paint:

a. Exposed or exterior installations of elastomeric closed cell insulation shall be painted with two coats of water base latex enamel.

| MINIMUM DUCT INSULATION REQUIREMENTS | | | | |
|---|---|---|---|---|
| | EXTERIOR | ATTIC | UNCONDITIONED SPACES | INSIDE CONDITIONED SPACES |
| **SUPPLY DUCT** | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| RETURN DUCT | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| OUTSIDE AIR | | | | |
| Duct wrap | -- | R-8 | R-8 | R-6 |
| EXHAUST DUCT | | | | |
| Duct wrap | -- | R-8 | R-8 | -- |

| Domestic Water Piping | | |
|---|---|---|
| Insulation Thickness for Pipe Sizes (Fiberglass) | | |
| Temperatures °F | Up to 1 1/4 in. (In.) | 1-1/2 in and Larger (in.) |
| Cold Water | 0.5 | 1.0 |

| | | |
|---|---|---|
| 105-140 | 1.0 | 1.5 |

END OF SECTION 15260

SECTION 15410 - PLUMBING PIPING

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. The work required under this section includes all work necessary for a complete installation of sanitary waste piping and domestic water piping inside the building to 5 feet outside the building, unless otherwise noted on drawings.

### 1.2 SUBMITTALS:

A. Submittals shall include the following:

1. Valves
2. Fittings

B. Submit test results for:

1. Pressure
2. Disinfection

## PART 2 - PRODUCTS

### 2.1 GENERAL:

A. Refer to design drawings for approximate locations of pipe and for pipe size.

B. Components for use in domestic water piping systems shall comply with NSF 61 and NSF 372 requirements.

C. Domestic Water Piping:

1. Water piping within building:

a. Copper tube, type "L" hard temper, ASTM B-88.

2. Piping below ground:

a. 2-1/2" and larger, type "K" hard temper; ASTM B-88.

b. 2" and smaller type "K" soft temper; ASTM B-88.

D. Sanitary Waste and Vent Piping:

1. Horizontal piping for fixture rough-ins may be DWV copper, ASTM B-306.

2. Schedule 40 PVC-DWV ASTM D-2665 using solvent cement ASTM D2564.

E. Fittings - Domestic Water Piping:

1. Wrought copper, solder type, ASTM B-75, ANSI B16.22.

F. Fittings - Sanitary Waste and Vent Piping:

1. Schedule 40 PVC-DWV, ASTM D-2665 using solvent cement ASTM D-2564

G. Unions(Domestic Water):

1. Solder unions shall be wrot copper, with copper ground joint. ASTM B75, ANSI B16.22.
2. Di-electric, EPSO, 250 lb. WOG.

H. Solder:

1. Solder Metal shall conform to ASTM B32-alloy grade 95TA: 95 percent tin, 5 percent antimony. Joints shall be made with approved solder containing not more than 0.2 percent lead.

I. Valves:

1. Approved manufacturers: Nibco, Hammond, Crane, Apollo, Milwaukee, or approved equal.

2. Ball valves 2 inches and smaller: Valves shall be rated 600 psi Non-shock CWP will have two piece bronze bodies, TFE seats, full port, separate pack nut with adjustable stem packing, anti-blowout stems and Silicon bronze or stainless steel ball. Valve ends shall have full depth ASME threads or extended solder connections and be manufactured to comply with MSS SP-110. Valves shall be third party certified lead-free and IAPMO IGC-157, NSF/ANSI-61-8 Commercial Hot 180°F and NSF/ANSI-372 listed. Valves shall be marked as lead-free and shall have white handles. Valves shall be equipped with 2" extended handles of non-thermal conductive material. Provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included. Valves shall be Nibco T585-80-LF-NS for threaded piping or Nibco S585-80-LF-NS for solder piping.

3. Butterfly valves 2-1/2 and larger: Valves shall be lug, wafer or I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2" extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer-coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Valve shall include lever operator with 10-position throttling plate. Lug-style and grooved style shall be capable for use as isolation valves and recommended by manufacturer for dead-end service at full pressure without the need for downstream flanges. Valves shall be third party certified lead-free NSF/ANSI-372. Valves shall be Lug body, aluminum bronze disc LD2000-3; Wafer body, aluminum bronze disc WD2000-3; Grooved body, rubber-coated disc GD4765-3.

4. Check valves 2 inches and smaller: Valves shall be 200 psi CWP, shall be Y-pattern swing type manufactured in accordance with MSS SP-80. Body to be of lead-free silicon bronze; TFE seats. Valves shall be third party certified lead-free and NSF/ANSI-61-8 Commercial Hot 180°F and NSF/ANSI-372. Valve ends may be threaded or solder-type. Valves shall be marked as lead-free. Valves shall be Nibco T413-Y-LF for threaded piping and Nibco S413-Y-LF for solder piping.

5. Check valves 2 1/2 inches and larger: Valves shall be lead-free cast iron body,

sliding disc silent check valve, spring actuated with renewable cast bronze seat and bronze disc. Valve shall be flanged wafer style body style, 200 psi, 125 lb Pressure Class, 200 deg F, Cast Iron Body, with Bronze/Alloy/Stainless Steel Trim. Valve shall be Nibco F-910-B-LF.

## PART 3 - EXECUTION

### 3.1 GENERAL:

A. All piping shall be routed to conserve building space, be coordinated with items installed by other trades and not interfere with access to or operation of the facility.

B. Provide roof flashings for pipe penetrations through roof, to be installed by roofing contractor. Install roof drains as recommended by manufacturer and such that piping does not carry weight of roof drain.

C. Water piping within building shall be size indicated on plans and risers. In the event no size is shown, pipe size or size required by the Plumbing Code. Piping shall be sloped toward a system drain and toward outlets, to provide for system drain-down. If installed near exterior walls, piping shall be located on the interior side of insulation. Install piping to prevent direct contact between ferrous and non-ferrous materials. Allow flexibility for expansion in piping.

D. Domestic water piping system shall be tested with potable water at a pressure of 125 psig or 25 psig above design working pressure, whichever is greater for 12 hours. Test shall be conducted with plumbing inspector unless approved otherwise in writing.

E. Water distribution piping shall be disinfected prior to occupancy or system start-up with a chlorine solution 50 ppm. Allow system to stand for six hours minimum, then exercise all valves to ensure treatment of all branches and components. System shall be flushed with potable water after disinfection and prior to placement into service.

F. Storm drainage and sanitary waste and vent piping shall be tested in accordance with water and air tests as specified in the Plumbing Code, in addition to any tests required by the local plumbing official. (10 feet of head with no apparent leaks. Hold for 30 minutes minimum). Flush all gravity piping including floor drains and roof drains prior to turning over to the Owner.

### 3.2 PREPARATION:

A. All pipe shall be cut square. Ream pipe and tube ends and remove burrs. Clean the ends of pipes to remove oil, grease and oxides.

B. Prepare piping connections to equipment with flanges or unions.

C. All soldered piping and equipment connections shall be properly prepared in accordance with good piping practice. Apply a thin layer of flux to only the male tubing. Rotate into the fitting with one or two revolutions.

### 3.3 INSTALLATION:

A. Domestic Water Piping:

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

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

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

4. Provide access where valves and fittings are not exposed.

5. Install valves with stems upright or horizontal. Provide drain valves at low points in systems.

6. Test cold water piping before being insulated, or concealed in walls or ceiling.

B. Sanitary Waste and Vent Piping:

1. Horizontal soil, waste and drainage lines within building shall have a minimum uniform slope of 1/8 inch per foot on 3 inch and larger, and 1/4 inch per foot on lines 2 inch and smaller.

2. Turns in sanitary, soil, and drain piping shall be made using 45 degree elbows, wyes, quarter-, eighth-, or sixteenth bends, or other bends approved by the Plumbing Code.

3. Do not use sanitary tees or crosses except where discharging from horizontal to vertical.

4. Make changes in pipe sizes with reducing fittings and recessed reducers. Do not reduce line size in direction of flow.

5. Provide cleanouts in all horizontal turns in waste piping greater than 45 degrees.

6. Provide deep seal traps on all floor drains, and trap primers where required by code or as indicated on drawings.

7. Indirect waste lines dumping into floor or hub drains shall maintain a 2-inch air gap between the end of the waste line and the rim of the floor or hub drain.

3.4 APPLICATION:

A. Install unions downstreams of valves and at equipment or apparatus connections. Install dielectric unions where joining dissimilar materials.

B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install brackets at cast iron no hub cleanouts to protect the integrity of the joint.

END OF SECTION 15410

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK:

A. This specification describes the requirements for labor and materials required for the installation of plumbing specialties included as part of the building plumbing system.

### 1.2 SUBMITTALS:

A. Manufacturer's literature indicating model numbers and options.

1. Cleanouts
2. Water Hammer Arresters
3. Pressure Reducing Valves
4. Trap Seals
5. Floor Drains
6. Wall Hydrants
7. Thermostatic Mixing Valves

B. Format shall include a schedule of the specialties submitted and include identification number of each item, such as "FD-1 Floor Drain," a list of each component, accessory, and option of the item being submitted. This schedule must be included in the front of the submittal page.

## PART 2 - PRODUCTS

### 2.1 CLEANOUTS:

A. Cleanouts shall consist of a coated cast iron body with threaded top with spigot or no-hub connection and gasketed bronze closure plug with countersunk slot. Head shall be adjustable in height; provide non-skid covers for floor cleanouts. Provide thread shield to protect adjustment threads from concrete as required.

B. Cleanout Covers:

| Location | Adjacent Finish | Material | Features |
|---|---|---|---|
| Interior | Terrazo | Nickle Bronze | Round Recessed Top |
| Interior | Tile | Nickle Bronze | Square Recessed Top |
| Interior | VCT | Nickle Bronze | Square Recessed Top |
| Interior | Carpet | Nickle Bronze | Round, Carpet Maker |
| Interior | Concrete | Nickle Bronze | Round |
| Exterior | Concrete | Cast Iron | Vandal Proof Secured Top |
| Wall | All | Chrome | Plated Covers |

C. Cleanouts shall be Jay R. Smith, Wade, Josam or Zurn.

### 2.2 WATER HAMMER ARRESTERS:

A. Water Hammer Arresters shall be constructed of a stainless steel or copper shell, stainless steel or elastomer bellows, with precharge of air, nitrogen, or argon. Arresters shall conform

to ASSE Std. 1010, and shall be Zurn "Shoktrol", Josam "Absorbotron", Wade "Shokstop", or Precision Plumbing Products "Shock Arrester". Sizing shall be in accordance with PDI Standards.

2.3 PRESSURE REDUCING VALVES:

A. Pressure Reducing Valves shall be equal to Watts Series LF25AUB-Z3-GG with lead free copper silicon alloy body, reinforced EPDM diaphragm and stainless steel spring, integral stainless steel strainer on inlet side, integral by-pass, pressure gauge, and threaded ends. All parts shall be serviceable without removing the valve from inline. Valve shall have adjustable reduced pressure range of 25-75 psi.

2.4 TRAP SEALS:

A. Provide an elastomeric, normally closed trap guard device to prevent evaporation of the trap seal and to protect against sewer gases from backing up into habitable areas. Device shall open with fluid and allows liquid drainage to flow through into the building drain. Trap seal shall be Trap Guard by Pro-Vent Systems or approved equal.

2.5 FLOOR DRAINS (FD):

A. FD-1: General duty floor drain, coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar, round polished nickel-bronze strainer top, square heelproof openings, and secured grate. Jay R. Smith 2005Y-A or equal by MIFAB, Zurn, Wade, or Josam.

2.6 WALL HYDRANTS (WH):

A. General: Wall hydrants shall be bronze, with integral vacuum breaker, ¾ inch hose thread, key operator. Units shall be non-freeze type. Jay R Smith, Zurn, Woodford, Wade, and Josam are approved manufacturers.

B. WH-1: Lockable, recessed wall hydrant, nickel bronze plated, quarter turn stainless steel box with hinged locking cover. Jay R Smith 5509 QT.

2.7 THERMOSTATIC MIXING VALVES (TMV):

A. Thermostatic type with liquid filled motor. Bronze body construction with replaceable corrosion resistant components. Valve construction shall be sliding piston control mechanism. Piston and liner shall be of stainless steel material. Valves shall be equipped with removable union end stop and check inlets with stainless steel strainers. Valve shall provide protection from hot and cold supply line failure and thermostat failure.

B. Include dial thermometer and shut off valve on tempered water outlet. Lawler Model 801.

C. Holby, Symmons, Leonard, and Watts are also approved manufacturers.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. CLEANOUTS:

1. Cleanouts shall be installed in horizontal runs at spacing of no more than 75 feet.

Install cleanouts at the base of every soil and waste stack, and at each 90 degree change in direction. Install cleanouts which are not easily accessible up through floor or wall and provide applicable covers. Install cleanouts to allow at least 18" for rodding.

B. WATER HAMMER ARRESTER:

1. Water hammer arrester sizing shall be in accordance with PDI Standards. Arrester shall be installed in accordance with manufacturer's instructions and as near the shock source as practical. Install to allow unobstructed path from shock source to arrester.

C. PRESSURE REDUCING VALVES:

1. Install Pressure Reducing Valves where shown on drawings in accordance with manufacturer's instructions.

2. Set final outlet pressure for 60 psi unless otherwise indicated. Install in horizontal and accessible location. Install shut off valves and strainer (unless integral with unit) upstream of pressure reducing valve and shut off valve downstream of the pressure reducing valve. Install pressure gage, unless integral with unit, downstream of pressure reducing valve.

D. TRAP SEALS:

1. Trap seals shall be provided for all floor drains, floor sinks, hub drains, etc., as noted on the plans.

2. Install trap seals and accessories in accordance with manufacturer's instructions.

E. FLOOR DRAINS:

1. Flush-floor drains shall be able to support traffic. Drains installed in building floor shall be sealed in such a manner as to prevent leakage of water around trap and body to ceiling below.

2. Provide 3 ft. sq., 6 mil butyl membrane, at each floor drain. Clamp membrane. Membrane shall be recessed in the floor slab with topping poured over it.

F. WALL HYDRANTS:

1. Install wall hydrants as indicated on drawings, minimum height 18" A.F.F. unless otherwise indicated.

G. THERMOSTATIC MIXING VALVES:

1. Install thermostatic mixing valve as indicated on the drawings. Provide isolation valves and install the thermometer where it is readily visible.

END OF SECTION 15430

SECTION 15440 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This specification describes the requirements for plumbing fixtures and their installation.

1.2 SUBMITTALS:

A. Submittals shall include manufacturer's data sheets and dimensional information on all fixtures and accessories according to Section 15015 - Mechanical Submittals.

B. Format shall include a schedule of the fixtures submitted and include identification number of each item, such as "WC-1 Water Closet", and list of each component and accessory of the fixture, including manufacturer's model number. This schedule must be included in the front of the submittal booklet.

1.3 CODES AND STANDARDS:

A. American National Standards Institute (ANSI)

B. American Society of Safety Engineers (ASSE)

C. American Society of Mechanical Engineers (ASME)

D. American Society for Testing and Materials (ASTM)

E. International Plumbing Code

PART 2 - PRODUCTS

2.1 GENERAL:

A. Vitreous ware shall be white, regular section, of weight required, free from cracks, flaws, blisters, crazes or other defects. Provide with mounting brackets for wall mounted fixtures unless floor carriers are indicated.

B. Stainless steel shall have machine ground finish. Decks and sink compartment sides shall be buffed. Exposed surfaces shall have no. 4 satin finish. Interior surfaces shall be deadened. Exposed metal parts shall be chromium plated and protected during construction by a coat of grease.

C. Water closet and urinal carriers shall have tapered thread face plate, plastic coupling with test cap, and neoprene rubber gasket. Lavatory, sink and urinal carriers shall have rectangular structural steel uprights. Carriers shall have necessary accessories for proper installation. Carriers shall be according to ANSI A112.6.1M.

D. Water closets and urinals shall have bolt caps.

E. Seats shall be white, solid plastic, with internal check and molded stainless steel hinge without visible metal parts, except as hereinafter specified.

F. Chromium plated traps shall be brass with chromium plated nipple to wall and escutcheon.

G. Fittings and accessories specified designate type only; provide modifications to make fittings work properly with fixture and piping.

H. Provide necessary tailpiece and shanks.

2.2 FIXTURES

A. Provide fixtures, in complete working order, as described below and on the drawing.

WC-1 WATER CLOSET (ADA COMPLIANT, FLOOR MOUNT, FLUSH VALVE):

1. Kohler K-96057 floor mounted, vitreous china, flush valve water closet, ADA compliant, elongated bowl, siphon jet flushing, 1-1/2" top spud and bolt caps, 1.6 gallons per flush.

2. Sloan Royal 1.6-YJ exposed manual flush valve, 1.6 gallons per flush, non-hold-open, low force ADA compliant handle. Coordinate handle location with open side of fixture. Provide with wall mounted split ring pipe support.

3. Kohler K-4670-C elongated toilet seat with check hinges.

LAV-1 LAVATORY (ADA COMPLIANT, WALL MOUNTED, SINGLE HOLE FAUCET):

1. Kohler K-2007 wall mounted, vitreous china, with overflow and single faucet hole, drilled for concealed arm wall carrier.

2. Delta 22C651, single lever handle faucet, single hole, 0.50 gpm, vandal-resistant outlet.

3. McGuire LF170, 1/2" x 3/8" sweat lavatory supplies with wheel handle stops.

4. McGuire 8902, 1-1/4 inch x 1-1/2 inch p-trap with escutcheon. Grid strainer. Provide offset drain piping as required for ADA compliant installation.

5. Provide Zurn ZW1070XL thermostatic mixing valve mounted below countertop. Set discharge temperature to 100 F.

6. Zurn Z-1231 lavatory concealed arm wall carrier.

7. ADA compliant trap and supplies covers by Truebro or equal.

SK-1 STAINLESS STEEL SINK (SINGLE COMPARTMENT, CLASSROOM):

1. Just Manufacturing Co. CRB-2022-A-GR, single compartment self-rimming, 18 gauge, 304 stainless steel sink, fully undercoated, three faucet holes on 4" center, one hole punched for bubbler.

2. Just Manufacturing Co. JGN-5 deck mounted faucet with swivel gooseneck spout and lever handle. JCB-2, polished chrome, push-button bubbler.

3. Just Manufacturing Co. J-35 stainless steel crumb cup stainer with 1- ½" chromed brass tail piece.

4. McGuire 8912 1-1/2" x 1-1/2", 17 gauge brass p-trap with tubular wall bend.

5. McGuire 171 1/2" x 1/2" chrome-plated supplies with stops.

2.3 ACCEPTABLE MANUFACTURERS:

A. Fixtures, Vitreous China - American Standard, Zurn, Kohler

B. Fixtures, Stainless Steel - Just, Elkay

C. Flush Valves - Sloan, Zurn

D. Toilet Seats - Olsonite, Sperzel, Church, Beneke, Bemis

E. Faucets - Delta, Sloan, T&S Brass, Speakman, Chicago, Symmons

F. Terrazzo - Fiat, Cutler, Florestone, Stern-Williams

G. Wash Fountains - Bradley, Acorn, Willoughby

H. Trim, Chromed Brass - McGuire, Sanitary Dash, Bridgeport

I. Carriers - MIFAB, J. R. Smith, Josam, Zurn, Wade

PART 3 - EXECUTION

3.1 GENERAL:

A. Verify all dimensions by field measurements. Verify that all plumbing fixtures are installed in accordance with pertinent codes and regulations and reference standards.

B. Verify location of rough-in for potable water and waste piping.

C. Examine walls, floors, and millwork for conditions suitable for fixture installation.

D. Securely anchor bars, shower heads, shower head bars, etc. to metal studs in dry wall construction by angle irons.

E. Carriers shall have short feet. Lavatory carriers shall have concealed arms. Bolt carrier feet to the floor with 1/2 inch bolts and anchors.

F. Flush valves shall be ASSE 1001 diaphragm type, quiet, screwdriver stop with cover, vacuum breaker, solder sweat kit, and handle.

G. Fixture connections may be made using "Aquaflo" flexible connectors of polymer and stainless steel braided covering.

3.2 INSTALLATION:

A. Install plumbing fixture level and plumb, in accordance with fixture manufacturer's published literature, rough-in drawings, codes regulations, and reference standards.

B. Fasten plumbing fixtures securely to supports or building structure. Rigidly support water supplies behind or within wall constriction.

C. Provide stop valve in the water supply to each fixture in an accessible location.

D. Connect fixtures to water supply with copper or brass (no steel).

E. Each fixture, floor drain and piece of equipment requiring connection to drainage system to have separate traps installed as close to fixture as possible.

F. Provide iron or steel backing for all wall mounted fixtures (or wood backing only if building structure is wood).

G. Provide escutcheons at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.

H. Apply SCP3154 primer and General Electric Co.'s No. 1702 silicone sanitary sealant around plumbing fixtures to conceal voids at wall and contact points of fixture after walls have been painted.

I. Apply SCP3154 primer and General Electric Co.'s Silpruf Sealant on plain concrete walls.

3.3 TESTING AND QUALITY CONTROL:

A. Inspect each unit for damage. Replace damaged fixtures.

B. Test fixtures to demonstrate operation. Replace malfunctioning units and retest.

C. Adjust water pressure at faucets, shower valves, and flush valves to provide proper flow.

D. Replace washers of leaking or dripping faucets and stops.

3.4 CLEANING:

A. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials. Remove labels.

B. Re-clean fixtures prior to owner occupancy.

3.5 PROTECTION:

A. Provide protection covering for installed fixtures, water coolers, and trim.

3.6 MOUNTING HEIGHTS SCHEDULE:

A. Typical mounting heights are noted below. Refer to architectural details for additional information and exact mounting locations. Defer to architectural for all mounting heights differing from these.

| Fixture | Mounting Height |
|---|---|
| Lavatory or Sink | 31 inches floor to rim<br>(34 inches for handicap) |
| Water Closet | 15 inches floor to rim<br>(16-3/4 inches for handicap) |

| | |
|---|---|
| Drinking Fountain | 42 inches floor to bubbler<br>(36 inches for handicap) |

END OF SECTION 15440

SECTION 15450 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This specification describes the requirements for labor and materials necessary for the installation of plumbing equipment included as part of the building plumbing system.

1.2 SUBMITTALS:

A. Submittals shall include:

1. Water Heaters/Circulating Pumps/Expansion Tanks

a. Manufacturers Data Sheets

B. Format shall include a schedule of the items of equipment submitted and include identification number of each item, such as "WH-1 Water Heater", and list of each component, accessories, and options. Include the schedule in the front of the submittal package.

PART 2 - PRODUCTS

2.1 POINT-OF-USE, TANKLESS, ELECTRIC WATER HEATERS:

A. Tankless water heater to utilize complex algorithm, actively managing power application to real time system demand. Integrated flow meter, along with inlet and outlet temperature sensors provide data which allows the unit to instantly adapt to variations in input parameters.

B. Tankless water heater shall have ABS-UL 94 5VA rated cover. Unit shall allow mounting in any direction. Heater shall be fitted with 3/8" compression fittings to eliminate need for soldering.

C. Maximum operating pressure of 150 PSI.

D. Unit shall have 0.2 GPM turn on.

E. Element shall be replaceable cartridge insert. Unit shall have replaceable filter in the inlet connector. Element shall be iron free, Nickel Chrome material.

F. Tankless water heater user interface must have the following capabilities:

1. Field serviceable elements

2. Selectable display including Celsius /Fahrenheit, setpoint, Flow rate, inlet temperature outlet temperature, power factor

3. Capable of displaying flow rate in gallons per minute & liters per minute

4. Diagnostic features to include error/fault display

5. Control board must maintain error/fault history of 5 events

G. Acceptable Manufacturers are EEMax, Chronomite, Rheem, or prior approval equal.

2.2 THERMAL EXPANSION TANK (Domestic Water):

A. Pre-charged hydropneumatic steel expansion tank, constructed in accordance with Section VIII of ASME Boiler and Pressure Code, with all welds conforming to ASME Section IX. Tank must be stamped with a maximum working pressure of 125 psi, and a maximum working temperature of 200 degrees F. All internal wetted parts must comply with FDA regulations and approvals. An internal butyl diaphragm will be used to isolate air from water. Amtrol or approved equal ST-1 series sized as shown on plans.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install in accordance with manufacturer's instructions. See details on drawings for additional information.

END OF SECTION 15450

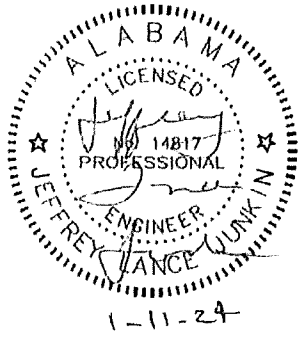
# CLASSROOM ADDITION FOR
# MARGARET ELEMENTARY SCHOOL
# (#23-41)

**PROJECT NO. 23104**

**JANUARY 2024**


**STEWART ENGINEERING, INC.**
**ELECTRICAL CONSULTANTS**

**PHONE (256) 237-0891** **ANNISTON, ALABAMA 36202**

## 1.0 - GENERAL

### 1.1 Related Documents

The general provisions of the contract, including General Conditions and General Requirements, apply to the work specified in this section.

### 1.2 Description of Work

Furnish all labor and materials required to complete the electrical work indicated on drawings or herein specified. Major work included in this section shall be:

A. Arrange with local utility companies for providing such electrical and electronic services as indicated or herein specified. Pay to utility companies any charges associated with providing these services.

B. Remove or relocate all electrical or electronic services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto.

C. Furnish and install complete electrical light and power system.

D. Connect all meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches and/or other equipment forming part of the system.

E. Connect all electrical equipment mentioned in this section or noted on drawings, whether furnished by Electrical Contractor or by others.

F. Procure and pay for permits and certificates as required by Local and State Ordinances and Fire Underwriters Certificate of Inspection.

G. Complete alterations and additions to existing Fire Alarm System.

H. Complete alterations and additions to existing Sound System.

I. Furnish and install outlet boxes, faceplates, conduit raceways, cable, data outlet faceplates and jacks, patch panels, IDF cabinets and termination connectors and all other equipment needed for complete Telephone and Computer Cabling System.

J. 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.

K. Submit to Architect a Certificate of Final Inspection from local Inspection Department along with assurance of completion of any items on this list.

1.3 Qualifications Of Electrical Subcontractor

The Electrical Subcontractor shall meet the following qualifications:

A. 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.

B. Have completed at least five (5) projects with Electrical installations of character and scope comparable with this project. Contractor must supply list of projects, with the project shop drawings, for approval. If Contractor uses subcontractor for any portion of project, the name of this subcontractor must be submitted, along with similar project list, for approval.

C. 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.

D. 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.

1.4 Drawings

A. Drawings indicate diagrammatically extent, general character and approximate location of work. Where work is indicated but with minor details omitted, furnish and install it complete so as to perform its intended function. For Building Details and Mechanical Equipment follow Architectural, Structural and Mechanical Drawings and fit electrical work thereto.

B. Take finish dimensions at Job in preference to scale dimension.

C. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

1.5 Manufacturers Drawings and Data

A. Within twenty (20) days after award of contract submit six (6) copies of Manufacturer's drawings to Architect for review of the following items. Partial submittals will be acceptable. Shop drawings of a specified item or system to be in one submittal:

1. Lighting Fixtures
2. Panelboards
3. Disconnect Switches
4. Intercom Sound System
5. Fire Alarm System
6. Computer Cabling System
7. Occupancy Sensors and Lighting Control Equpment
8. List of five (5) projects that Contractor (and any sub-contractor) has completed similar in size and capacity to this project

B. Drawings of power equipment to contain exact details of device placement, phasing and numbering in elevation form. They shall also contain elevation view of front panelboard/switchboard outside cover.

C. See Section 01350 – Administrative Requirements, for submittal procedures.

1.6 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.

B. Be informed as to equipment furnished by other trades but not liable for added cost incurred by equipment substitutions made by others above wiring indicated on drawings.

1.7 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.

1.8 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, warning lights, instruct workmen and others who may be subject to construction hazards.

B. 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, lenses or reflectors will be accepted.

1.9 Service Entrance

A. Main service shall be as shown on drawings. Verify with the local utility company that the location, arrangement, voltage, phase and connections to utility service as well as required metering equipment are coordinated with and in accordance with requirements of the local utility company. If their requirements are at variance with these drawings or specifications, the contract price shall include any additional cost necessary to meet those requirements without extra cost to the Owner after contract is entered into. Notify Architect of any changes required before proceeding with work.

1.10 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 completion of the work, remove all material, scrap, etc., not a part of this contract.

1.11 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.

1.12 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, any defect becoming apparent during this period, upon notification and at no charge to Owner.

B. See Section 01910 – Closeout Submittals, for additional warranty requirements.

1.13 Temporary Systems

A. The Electrical Contractor shall be responsible for the furnishing and installation of all equipment and materials necessary for providing temporary power required by all trades during construction. All temporary wiring shall be installed so as not to interfere with the new construction and shall be made in a safe and approved manner.

B. It shall be the responsibility of the Electrical Contractor to visit the site prior to submitting bid and thoroughly review all existing conditions affecting the temporary system requirements.

2.0 PRODUCTS

2.1 Standard of Materials

A. All materials shall be new and listed by the Underwriters' Laboratories as conforming to these standards.

B. 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 days prior to bid date.

C. 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 manufacturer or workmanship, before or after installation.

2.2 Conduits

A. Rigid: To be mild steel piping, galvanized inside and outside, and conform to ASA Specification C80.180.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.

B. Intermediate Metal Conduit: Shall be hot dipped galvanized inside and outside, and manufactured in accordance with U.L. Standard #6 or #1242. By Allied or approved equal.

C. E.M.T.: To be of high grade steel electro-galvanized outside and lacquer or enamel coating inside and conform to ASA Specification C80.1 and Underwriters' Laboratories Specifications. By Sprang, Republic, Wheatland, Triangle or Pittsburg.

D. PVC: To be of high impact PVC Schedule 40 and conform to Underwriters' Laboratories Standard UL-651. PVC to be used only where indicated on drawings. By Pittsburg, R. G. Sloane or Carlon.

2.3 Couplings and Connectors

A. Rigid & IMC: By Raco, Efcor, Republic or Appleton.

B. E.M.T.: All steel raintight type. Pressure indented type or cast metal will not be approved. All connectors to be insulated. By Appleton, Raco or Efcor.

C. PVC: To be of high impact PVC Schedule 40. Joints to be made with PVC solvent cement as recommended by manufacturer. By Pittsburg, R.G. Sloane or Carlon.

2.4 Bushings

A. All rigid bushings 1 1/4" and larger shall be the insulated grounding type. All other bushings shall be OZ. Mfg. Co., Type B or Efcor Type 55 insulated metallic type or by Sylvania.

2.5 Conduit Seals

A. All conduit seals for wall, floor or ceiling penetrations shall be by 3M Company or approved equal.

2.6 Conduit Accessories

A. Conduit clamps and supports by Efcor, Steel City or G. A. Tinnerman. Conduit fittings by Pyle-National, Crouse-Hinds and Appleton.

2.7 Building Wire

A. Conductors shall have current carrying capacities as per N.E.C. and with 600 volt insulation THW #12 minimum. Conductors #3 and smaller to be copper. Conductors #2 and larger to be copper unless specifically indicated aluminum on drawings. Insulation for conductors to be N.E.C. Type THW for #3 and smaller. Insulation for conductors #2 and larger shown in cable specifications. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.8 Cable

A. Conductors for 0-600 volts shall have copper, current carrying capacities as per N.E.C. with cross-linked polyethylene insulation and thickness to IPCEA standards, and U.L. Standard #44. Rated for wet and dry locations. Type THW or THWN. By Phelps-Dodge, Rome, Simplex, General Cable, Okonite or Anaconda.

2.9 Fixture Wire

A. Conductors for fixtures of 300 watts or less shall be #16 type TFN, for fixtures of more than 300 watts #14 type TFN shall be used. Conductors in channel of fluorescent fixtures shall be type THHN or RHH. Conductors shall be either Phelps-Dodge, Anaconda, Rome or General Cable.

2.10 Control and Signal System Wire

A. Type TFF minimum size #16 copper and fully color coded. Conductors by Phelps-Dodge, Anaconda, Rome or General Cable.

2.11 Junction Boxes (thru 4-11/16")

A. Sheet Metal: To be standard type with knockouts made of hot dipped galvanized steel by Steel City, Raco, Appleton or approved equal.

B. Cast: To be type FS, FD, JB, GS or SEH as required for application.

C. Junction and Pull Boxes (larger than 4-11/16"): To be cast aluminum for all below grade exterior use and where shown all other shall be oil tight, JIC boxes not less than 16 gauge. Hoffman type "CH" Boxes.

2.12 Gutters

A. Up to and including 8" x 8" shall be a standard manufacturer's item as manufactured by Square D, ITE or B & C Company. Special gutters shall be made of code grade galvanized sheet steel with hinged covers having approved fastening devices. At each location shown for gutters, install a wood backboard not less than 3/4" thick, paint 2 coats of gray enamel, mount all equipment thereon. Conductors serving a gutter shall be extended without reduction in size for the entire length of the gutter. Tap-offs to the switches and other items serviced by the gutter shall be made with Penn-Union and Anderson compression connectors for aluminum conductors. Properly tape and insulate.

2.13 Outlet Boxes

A. Standard type with knockouts made of hot dipped galvanized steel. Ceiling outlet boxes shall be 4" octagon 1-1/2" deep or larger if required due to number of wires.

B. Boxes shall be provided with approved 3/8" fixture studs where required. Except when located in exposed concrete block switch and receptacles boxes shall be 4" square for single gang installation. Appropriate gang boxes shall be used for mounting ganged switches. Use Raco square block boxes for exposed block walls. By Steel City, Raco, National or Appleton.

2.14 Safety Switches

A. Furnish and install safety switches as indicated on the drawings. Switch to be NEMA Heavy Duty type HD and Underwriters' Laboratories listed. Safety switches to be G.E., Cutler Hammer, Sylvania or Square D Heavy Duty type.

B. Appropriately identify each safety switch by engraving micarta name plate.

2.15 Fuses

A. Branch feeder fuses to be Bussman Manufacturing Company dual element and fusetron. Main switch fuses to be Bussman Manufacturing Company dual Hi-Cap. Fuses to be used only where indicated on drawings. Equals by Littel Fuse accepted.

2.16 Manual Motor Switches

A. Thermal overload protection to be provided for single phase motors by manual switches with overload units rated as required by specific motor to be served. Manufactured by Cutler Hammer or Square D with NEMA Type 1 enclosure.

2.17 Wiring Devices

A. Switches shall be A.C. type as made by Hubbell, P & S, Sierra, Bryant, Slater or Arrow Hart as shown on the drawings.

B. Receptacles shall be Hubbell, Bryant, P & S, Sierra, Slater or Arrow Hart as shown on the drawings.

C. Wiring devices shall be gray with stainless steel plates, beige with brass, ivory with ivory bakelite, brown and brown bakelite.

2.18 Special Purpose Receptacles

A. Special purpose receptacles (other than 120V, 20A) shall be complete with a matching cord grip cap of the same manufacturer. See plans for special receptacles required in various locations.

2.19 Floor Outlets

A. Floor outlets shall be an adjustable, galvanized floor box finished with accessories as required for a complete installation for power or communications. Except as identified otherwise on the plans, use Type "A" outlets as follows:

1. Type "A" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-2425 brass plate, #SC-3091 service fitting, receptacle and required accessories. Signal outlets shall be the same except #SC-3090 service fitting.

2. Type "B" Outlet: Power outlets shall be Hubbell #2429 floor box finished with #S-3825 brass plate and complete with duplex receptacle and required accessories. Signal outlets shall be the same, less receptacle and with #S-2425 plate and #S-3086 nozzle furnished to the Owner.

3. Type "C" Outlet: Power outlets shall be Hubbell #B-2529 floor box furnished with #S-3042 carpet flange and #S-3040 service fitting with duplex receptacle. Signal outlets shall be the same, except with #S-3041 service fitting.

B. Where equipment is to be connected above floor level, delete service fitting and nipple or flex to connection from threaded brass floor plate.

2.20 Finishes

A. All electrical items (device and telephone plates, junction, floor outlets, under-floor duct junctions, outlets, and other miscellaneous items) to match finish of building hardware in area installed. Unfinished areas with exposed conduit, shall have surface mounted boxes, gray switches and outlets, galvanized metal plates with beveled edges. All outlets to be gray with stainless steel plates.

2.21 Fixtures

A. Fixtures shall be furnished as shown in fixture schedule on drawings. It shall be specifically the responsibility of this Contractor to verify exact type ceiling and recessing depth of all recessed fixtures, prior to any purchasing of fixtures. Stems shall be approved ball aligner type swivel 30 degrees from vertical and swivel below canopy. Paint stems same color as fixture trim. Stems in unfinished areas to be unpainted conduit.

2.22 Guarantee And Warranty - Lamps

A. The guarantee and warranty shall apply to lamps as follows:

1. LED Fixtures: Per manufacturer's warranty period for LED driver.

B. Guarantees shall begin from date of final acceptance.

2.23 Lighting Panelboards

A. Furnish and install circuit breaker panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be of dead front construction equipped with thermal-magnetic molded case circuit breakers of frame size and trip ratings as shown on the schedule.

B. Circuit breakers shall be Square D type EDB (bolt-on) thermal-magnetic, molded case circuit breakers. Breakers shall be 1,2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multipole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the breaker case.

C. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated with continuous current ratings as noted on the plans. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

D. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall only bolt-on circuit breakers. All current carrying parts of the bus structure shall be plated.

E. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboard locks shall be keyed alike. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. Each front shall be furnished with a "hinged trim" accessory. 600A panelboard fronts shall have exposed trim clamps. Column width fronts shall be provided on the inside of the door.

F. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously be connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

G. Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

2.24 Receptacle Panelboards

A. Furnish and install circuit breaker lighting panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with frame and trip ratings as shown on the schedule.

B. Circuit breakers shall be Square D type QOB (bolt-on) thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multipole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. In addition, trip indication shall include a VISI-TRIP indicator appearing in the window of the breaker case. Bolt-on (NQOB) circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts ac maximum with continuous current ratings as noted on the plans. Interrupting ratings shall be 65,000 rms symmetrical amperes maximum at 240 volts ac maximum. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.

C. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall accept bolt-on (NQOB) circuit breakers. All current carrying parts of the bus structure shall be plated.

D. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboard locks shall be keyed alike. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. Each front shall be furnished with a "hinged trim" accessory. Column width fronts shall have exposed hinges and be screw cover type. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door.

E. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

F. Panelboards shall be listed by Underwriters Laboratories and bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).

2.25 Fire Alarm System

A. General

1. The contractor shall complete additions and alterations to existing low voltage, automatic and manual addressable fire alarm system, as specified herein and indicated on the drawings. The system shall include a central control panel, power supply, signal initiating devices, annunciator, remote station equipment, audible and visual alarm devices, provisions for connections to municipal fire circuits, a conduit and wiring system, all necessary devices required to provide a complete operating system.

2. The system shall comply with the applicable provisions of the current National Fire Protection Association Standard Number 72, and meet all requirements of the local authorities having jurisdiction. All equipment and devices shall be listed by the Underwriters' Laboratories, Incorporated or approved by the Factory Mutual Laboratories.

3. To establish the type and quality of system desired, the equipment specified is that of Notifier Company. No deviation will be considered unless submittals are received and approved, in writing, not less than ten (10) days prior to bid date. Simplex and Edwards are approved equals.

B. Control Panel

1. The Contractor shall provide and install all necessary expansion cards to the existing Notifier Addressable Control Panel.

C. Power Supply

1. Shall be 24 volt D.C., filtered and regulated, and shall provide sufficient power for all system functions.

2. The fire alarm system main power supply shall operate from 120 volt A.C. This connection shall be made in conduit or cable in accordance with local and national codes. Separate over-current protection shall be provided, marked "FIRE ALARM".

3. The 120 volt A.C. main power shall be converted to low-voltage direct current for system operation. The system shall operate on 24 volts D.C. with trickle charged batteries provided as an emergency source of supply for operating the system in the event of the interruption of main power. A changeover relay in the Control Panel shall transfer to standby power automatically upon main power failure and automatically reconnect to main power upon restoration.

D. Fire Alarm Pull Stations

Shall be Notifier Type LNG-1 flush mounted with MMX-101 monitor module. Stations with two sets of contacts will not be acceptable.

E. Smoke Detectors

Notifier Model SDX-551 photoelectric smoke detector, dual chamber design shall be installed where shown on plans.

Type DHX-501 Duct Housing with SDX-551 photoelectric detector, sampling tubes and CMX-2 shutdown relay shall be installed in air-handling system duct work where shown on plans. Optional feature for actuation of contact closure for fan shut-down and/or damper closure on alarm shall be provided in Control Panel. Remote indicator shall be Notifier RA-400.

Contractor shall wire System such that if the System goes into alarm (any zone), all HVAC units will be shut down.

F. Signaling Devices

Notifier Model SHG24-1575WR Combination Horn-Strobe unit shall be installed where shown on plans. Notifier Model GXS-4-1575WR Strobe Unit shall be installed where shown on plans. Notifier Model SPK4-24-1575 combination Speaker-Stobe shall be installed where indicated on the plan. All Horn-Strobe units shall meet ADA requirements. Make separate connections to horns and to strobes to permit strobes to operate after system is silenced.

G. Remote Station Receiving Panel

1. Terminals and other necessary facilities shall be provided in the Control Panel to permit automatic transmission of trouble and alarm signals over leased or private owned telephone cable to a Remote Station Receiving Panel located in the fire, police, or other continuously manned facility, so designated for response to fire emergency.

2. Receiving equipment compatible with existing system, if applicable, shall be installed under this contract. Install Notifier 911A Digital Communicator.

3. The contractor shall coordinate requirements with telephone company and cognizant municipal fire officials to assure a complete operating system performing all functions specified and shall so attest by written certification to the architect prior to acceptance of building for occupancy.

H. Wiring

1. All wiring shall be in accordance with the NATIONAL ELECTRICAL CODE and the local code having jurisdiction. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm and auxiliary circuits, and 14 gauge for signal initiating circuits. Typical diagrams shall be provide for devices and power wiring.

2. Wiring shall be run in conduit. In general the wiring shall consist of:

   From the Control Panel.

   a. West Penn No. 995 shielded twisted pair common to all Fire Alarm Stations or Detectors.

   b. 4#14 wires common to each circuit of Fire Alarm Signals.

I. Certified Fire Alarm Contractor

1. The Certified Fire Alarm Act requires that the company installing the fire alarm system must be licensed as a Certified Fire Alarm Contractor. The contractor must have a NICET Level III Technician in a position of responsibility, and the license must be issued in the name of the certificate holder and the contractor. The Certified Fire Alarm Act also requires that technicians working for the Certified Contractor must hold a current NICET Level II, or equivalent, certification. Contractors wishing to bid this project will be required to show evidence at the pre-bid conference that he/she meets the certification requirements of the Certified Fire Alarm Act and holds a permit/license issued by the State Fire Marshall.

J. Testing, Guarantee And Service

1. A Factory trained representative of the manufacturer shall supervise final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system. The Owner shall be provided with a written verification of this inspection and certification.
2. The Fire Alarm system shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from date of acceptance or beneficial occupancy; whichever earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

3. The equipment manufacturer shall be represented by a service organization, and the name of this organization shall be furnished to the Architect and Owner. The service organization shall furnish, gratis to the Owner, a one year maintenance and inspection Contract, effective from the date of final acceptance. The contract shall provide for four inspections during the contract year.

2.26 Sound System

A. General

The contractor shall complete alterations and additions to the existing Sound System as specified herein as shown on the plans together with all equipment and accessories required to provide a complete operating System. The System shall be installed by a factory trained sound system contractor for the equipment manufacturer.

The entire System shall be guaranteed for a period of one (1) year from the date of final acceptance of the installation and any defective equipment or parts shall be replaced or repaired, during the guarantee period, at no cost to the Owner.

The manufacturer and model numbers are provided to establish quality of equipment and operating requirements for the system. Any proposed substitution of equipment must be approved by the Architect within ten days prior to bid date. No substitution will be permitted after the project bid date.

B. Console

The contractor shall replace the existing Dukane Console with a new CAREHAWK CH1000 central controller and (3) CAREHAWK AP1 admin consoles. Contractor shall connect all existing zones and all new zones to new console for a complete operating system. All existing call-in switches, digital clocks, speakers, etc. are to remain.

C. Ceiling Speakers

a. Furnish speakers in classrooms, common areas, etc. as indicated on drawings.

b. Ceiling speaker assembly shall consist of Atlas SD72 speaker, Atlas CS95-8 enclosure, Atlas 62-8 baffle, and Atlas 180-2 supports.

c. Horn speakers shall be Atlas AP15T.

D. Call-In Switch

a. The INTERCOM SYSTEM shall allow for the use of normally open, normally closed, wireless and virtual call buttons. INTERCOM SYSTEMS not capable of using all the above call button types shall not be considered.

b. The INTERCOM SYSTEM shall allow for the use of virtual call buttons installed on local PC computers. INTERCOM SYSTEMS that do not support virtual call buttons shall not be considered.

c. Call buttons shall be Dukane D-CS25.

E. Wall Clocks

a. Dukane 4" clocks will be model 24ZB40 with 110-3902 recessed back box

b. Dukane clock power supply is model 110-3693 and requires 145-184-SC back box with 110-2191-SC door.

F. Sound System Installation

1. All wiring shall be in accordance with the local national codes.

2. Wiring shall be run in conduit except where accessible above lay-in ceilings. The wiring shall consist of the following:

   a. West Penn 357 cable from amplifier to speakers.

2.27 Data Cabling System

A. General

1. All fiber optic and level 6 cable, data outlet faceplates and jacks, patch panels, MDF frame and IDF cabinets, outlet boxes, conduit, cable support hardware, and all other hardware as required to complete the installation described in these specifications shall be supplied and installed by this contractor.

2. All terminations are to be made by the contractor.

3. To be qualified to bid on this project, the contractor shall have successfully completed a minimum of five (5) projects for installation of fiber optic cable and a minimum of ten (10) projects for installation of Category 6 unshielded twisted pair cable.

B. Data Cabling System

1. The cabling system shall allow the owner to transmit up to speeds of 100 Mbs plus.

2. One 6-strand fiber optic cable shall be routed from the Main Distribution Frame (MDF) to each Intermediate Distribution Frame (IDF) and terminated on each end (all 6 strands).

3. Solid core Category 6 cable shall be routed from each IDF to the outlets and terminated on each end. Two (2) Category 6 cables shall also be routed from the MDF to each IDF and terminated on each end.

C. Data Outlet and Cabling System (Category 6 UTP)

1. Cable Installation

   a. All cables shall be independently supported throughout the entire project by J-hooks installed on 4'-0" centers.

   b. Cables shall be routed in groups of similar types. (i.e. data outlet cables grouped together, fiber optic cables grouped together, etc.)

   c. Cables shall be routed in accordance with EIA TIA 568A standard.
   d. The BICSI Methods Manual is to also be used as a guide for cable installations.

   e. Horizontal cabling routed above ceilings shall be supported using the following methods.

(1) Cables supported on J-hooks designed specifically for this purpose. Support J-hooks from structure with threaded rod. Hang J-hooks approximately two feet above the lay-in ceiling.

(2) Cables independently supported using cabling clips attached to the ceiling structure or slab.

f. All cable shall be neatly routed above the lay-in ceiling along one side of the corridor. Branch out across the corridors as necessary to serve the classrooms and offices. Cabling shall be routed in a manner which will allow the owner to maintain access to the cables, electrical systems and HVAC equipment above the ceiling. Maintainability of all systems above the ceiling is critical.

g. All cables shall be bundled and tie wrapped together. Tie wrapping shall occur on four foot intervals throughout the space. Tie wraps should not bite into the cable, but should form loosely around the cables as not to depress the cable.

h. Cables above the corridor ceiling shall be supported using wall mounted J-hooks equal to Caddy CAT32 with any necessary attachment hardware.

i. Cables shall be routed into conduits stubbed up above the ceiling from each outlet (bushing on end of conduit). Cabling shall be routed in conduit above non-accessible ceilings.

j. All cables being pulled shall not exceed the manufacturers recommendations for pulling tensions.

k. All cables shall not exceed the manufacturers recommendations for minimum bending radius upon pulling and completed installation.

l. All cables shall pass acceptable test requirements and levels as detailed in Section 2.35(F) of these specifications. Contractor to remedy any cabling problems or defects in order to pass or comply with testing. This includes terminations and the re-pull of new cable as required at no additional cost to the owner.

m. Cables shall not be spliced.

n. Ends of cables shall be terminated by the contractor on both ends unless otherwise noted.

o. Do not damage the outside jacket sheath of any cable.

p. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor.

q. Provide labeling for all cables.

r. Provide 12" wide ladder style tray with 1-2" side rails and 9" rung spacing in the MDF and IDF rooms.

s. Contractor shall insure that cabling is a minimum of 5" away from all light fixtures.

t. Contractor shall install three (3) 1" sleeves with bushings in walls for routing cables to classrooms and offices. Install sleeves above the ceiling, directly above the door to the classroom or office. Install two (2) 4" sleeves with bushings for each IDF and MDF. Firestop all firewall penetrations.

u. When cables turn down below ceiling at each IDF and MDF, contractor shall install sleeves through the lay-in ceiling (bushing on each end). Hole(s) through ceiling tile for sleeve(s) shall be cut to the exact size of the sleeve.

v. Install a J-hook directly above the drop to every outlet. Bundle and tie wrap up 5' of slack cable prior to entering the wall.

2. Cable Terminations

a. Terminations shall be made in accordance with EIA TIA 568B standard.

b. Terminations shall be RJ45 type.

c. Route individual four pair category 6 cable to the backside of each patch panel and punch down onto a port. Label each port on the front and rear of each panel.

d. Maintain twists of each pair to the punch down point. Do not strip more than one-half inch of insulation from the cable at termination points.

3. Outlets

a. Install outlets per manufacturer's instructions and recommendations.

b. Install and terminate all UTP cabling at each outlet as per manufacturer's instructions and recommendations.

c. Provide an outlet label on each cover plate and inside each wall box.

d. Leave at least 12" of slack cable at each outlet.

D. Fiber Optic Cabling System

1. Cable Installation

a. Fiber optic cable shall be installed inside buildings using the same methods as twisted pair; however, the following guidelines should be observed:

(1) Do not exceed maximum recommended pulling tension.

(2) Do not exceed minimum installed and long term bend radius.

(3) Avoid sharp bends and corners.

(4) Provide additional crush/mechanical protection in high risk environments.

(5) Do not exceed maximum vertical rise specification unless intermediate tension relief is used.

(6) Observe all governing building and fire codes (either by using a properly listed cable or suitable raceway).

(7) Do not deform the cable jacket, specifically when using cable fasteners or ties.

(8) All fiber optic cabling shall be routed in innerduct. Innerduct shall be orange and shall be 2" diameter equal to Endot Industries #1050. Install an extra pull string in all innerduct.

b. When installing fiber optic cable in vertical runs, the following special guidelines should be observed:

(1) Work from the top down, when possible.

(2) Install intermediate split wire mesh grip(s) wherever the maximum vertical rise is exceeded.

(3) Secure the cable in the riser wiring closets with cable ties or straps as needed to prevent accidental damage to cable.

c. When installing fiber optic cable, the following guidelines should be observed at termination and splice points:

(1) The amount of cable slack at termination points should allow the cable to be routed to the termination location with enough additional cable to reach a convenient location for the polishing, plus an additional ten feet.

(2) Fiber optic warning signs should be placed on all innerduct and conduits containing fiber optic cable. Warning signs can help prevent damage resulting from the cable being mistaken for something else. Install signs at each end of the cable and every 20 feet in between.

d. When pulling fiber optic cable, the following guidelines should be observed:

(1) Yellow pulling compound should be used if making long or difficult pulls to reduce cable drag.

(2) When pulling fiber optic cable by any mechanical device (winch etc.), a dynameter must be used to ensure the maximum tensile strength is not exceeded.

(3) The mechanical pulling device will be equipped with clutches or shear pins to ensure this.

(4) The fiber cable will be attached to the pull line via the strength member or mesh grip.

e. Provide labeling of each cable indicating >TO= and >FROM= information.

f. Bring fiber optic cables into patch panels or cabinets at one location. Innerduct around cables shall extend to patch panel or cabinet entrance. Secure cables inside patch panel or cabinet at entrance point by tying the fiber jacket and/or strength members. Break out individual fiber cables inside of panel or cabinet. Coil up approximately 6 feet of spare cable before applying SC connector.

g. Cable Terminations

(1) Terminations shall be SC type and shall be installed per the manufacturer=s instructions.

(2) Terminate the fiber optic cable onto the backside of the fiber optic patch panel using SC connectors.

(3) An SC connector shall be installed on each individual strand of fiber optic cable.

E. Labeling

1. General

a. All labels shall be vinyl.

b. All labels shall have an adhesive backing for permanent attachment.
c. All labels shall be of sufficient size. Minimum size shall be 12" W x 3/16" H for outlets, outlet cables and patch panels.

2. Installation

a. Install labels straight.

b. Install labels every 20' along cable, at locations previously specified and as follows:

(1) Outlet faceplates.

(2) Inside of outlet box.

(3) Outlet cable inside box.

(4) Outlet cable in ceiling above outlet.

(5) Outlet cable at rear of patch panel.

(6) Fiber optic cable at patch panels.

3. Text Size and Information

a. Text shall be as large and bold as possible.

b. All outlets and outlet cables shall contain the outlet number, final room number, IDF number and patch panel number.

F. System Testing and Certification

1. General

a. The following cabling systems shall be tested after installation is fully completed.

(1) Data outlet cabling from each outlet to the patch panel port, including patch cables.

(2) Fiber optic cabling from each IDF to the MDF. All six strands shall be tested.

b. Testing shall follow EIA TIA 568, TSB 36 and TSB 40 standards.

2. Category 6 Cable Testing

a. Cable testing shall be performed with a Micro-Test Pentascanner Plus or equivalent test unit. Test unit shall be capable of providing a Level 2 accuracy test and have a category 6 printout.

b. Each outlet/cable shall be tested and certified. Each pair of the end to end system shall be tested. End to end is from the outlet RJ 45 port through the RJ45 port at the Category 6 data patch panel. A 10' patch cable shall be used at the patch panel end and a 3' patch cable shall be used at the outlet end so that the outlet, outlet termination, cable, patch panel termination, patch cables and patch panel port can be seen in the test.

c. Test results shall be positive and favorable. End to end attenuation loss and near end cross talk shall meet or exceed category 6, EIA/TIA 568, TSB 36 requirements. Those requirements are:

| Frequency MHZ | Next Loss Worst Pair dB @ m (1000 ft) Category 6 | Maximum Attenuation Loss Worst Pair dB/m (1000 ft) Category 6 |
|---|---|---|
| 1.0 | 62 | 63 |
| 4.0 | 53 | 13 |
| 8.0 | 48 | 18 |
| 10.0 | 47 | 20 |
| 16.0 | 44 | 25 |
| 20.0 | 42 | 28 |
| 25 | 41 | 32 |
| 31.25 | 40 | 36 |
| 62.5 | 35 | 52 |
| 100 | 32 | 67 |

d. If a problem or failed test occurs, the contractor shall evaluate and remedy the problem. After a problem has been remedied, the contractor shall re-test the circuit and analyze test results. The contractor shall continue this process until the cable passes all tests.

e. Each outlet/cable test shall include:

(1) Overall cable length
(2) System continuity
(3) Proper connectivity
(4) Open pairs
(5) Short circuits
(6) Reversed pairs
(7) EMI noise induction
(8) Damaged cable
(9) Stretched, chinked or crimped cable
(10) Attenuation loss in dB
(11) Near end cross talk in dB

f. Provide the owner with three (3) copies of the test results and certification for all cables.

3. Fiber Optic Cable Testing

a. The fiber cables shall be tested in both directions at 850 nanometers and 1300 nanometers.

b. All test results shall be in writing giving all readings, date, tested by, and totals.

c. All testing shall be performed by using an Optical Power Meter (Wilcom Model T339 or approved equivalent).

d. Each strand shall be tested and the following information be turned over to the owner in chart form:

(1) From Point to Point

(2) Fiber I.D. Label No.

(3) RX Level

(4) Attenuation Total

(5) Wave Length

(6) Reference Level

e. Each strand shall not exceed a level of 3.0db of attenuation.

f. Provide the owner with three (3) copies of the test results and certification for all cables.

G. Products

1. Category 6 Cable

Solid core Category 6 cable shall be 4 pair, 24 AWG, UTP, with an orange jacket as manufactured by 3 Com. No stranded Category 6 cable shall be permitted.

2. Fiber Optic Cable

   Fiber optic cable shall be multimode indoor (10GB Speed) and FDDI rated with 6 strands as manufactured by 3 Com.

3. MDF and IDF Racks

   MDF and IDF racks shall be 7' high, 19" wide, aluminum and floor mounted as manufactured by Chatsworth. Install two (2) racks for the MDF and one (1) for the IDF.

4. Category 6 Patch Panels

   Patch panels shall be 24 or 48 ports, as necessary, wired 7568B as manufactured by 3 Com. Provide and install quantity necessary to terminate all cables.

5. Fiber Optic Distribution Unit

   Fiber optic distribution units shall be 24 port as manufactured by 3 Com.

6. Fiber Optic Cable Connectors

   Fiber optic cable connectors shall be "SC" type as manufactured by 3 Com.

7. RJ45 Jacks

   RJ45 jacks (568B) shall be as manufactured by 3 Com.

8. Data Outlet Faceplates

   Data outlet faceplates shall be gray in color as manufactured by 3 Com.

9. Ladder Tray

   Ladder tray shall be 12" wide, 1-1/2" side rails, 9" rung spacing and gray in color as manufactured by 3 Com.

10. Vertical Cable Management Rails

    Cable management rails shall be 6' high, 6" wide with rungs on front and rear and shall be as manufactured by 3 Com.

11. Rack Mounted Plugmold

    Plugmold shall be 6' long with 12 outlets, each on 5.25" centers, and a 15" cord. Plugmold shall be as manufactured by Wiremold (Part No. UL2062BD).

## 3.0 EXECUTION

### 3.1 Workmanship

A. All work shall be executed in workmanlike manner and present a neat and mechanical appearance upon completion.

B. Balance load as equally as practical on services and all feeders, circuits, and panel busses. All wiring in panelboards shall be laced and looped in a workmanlike manner.

C. Upon completion of work, test entire wiring system and show to be perfect working order in accordance with intent of specifications and drawings. This Contractor to have all systems ready for operation and electrician available to assist in removal of panel fronts, etc., to permit inspection as required.

D. All work shall be in accordance with the National Electrical Code and the rules and regulations of the local bodies having jurisdiction.

### 3.2 Excavation Cutting and Patching

A. Provide cutting and patching required for this section of work under supervision of the General Contractor. Coordinate with other trades as work progresses so cutting and patching will be minimal.

### 3.3 Sleeves, Inserts, and Supports

A. Provide and install No. 16 gauge galvanized steel or iron sleeves in all walls, floors, ceilings, and partitions. Sleeves shall have not more than 1/2" clearance around pipes and insulation.

B. Contractor shall furnish to other trades all sleeves, insert, anchors and other required items which are to be built in by trades for the securing of all hangers or other supports by the Contractor.

C. Contractor shall assume all responsibility for the placing and size of all sleeves, inserts, etc., and either directly supervise or give explicit instructions for installation.

D. Seal all conduits through floor, smoke or fire walls and sound barrier walls. All such penetrations shall be made with an Underwriters' Laboratories firestop assembly. Through floor conduit shall be sealed water tight.

E. Furnish and install steel angles and channels as required for mounting and bracing heavy equipment, and conduits. Steel shall be securely bolted or welded to structure and equipment bolted to steel framework. Obtain approval of Architect prior to welding.

### 3.4 Roof Penetrations

A. Furnish roof flashing for all equipment installed under this section that penetrates through the roof. Galvanized sheet, 24 gauge with base extending 6" beyond pipe.

3.5 Grounding

A. All equipment shall be grounded and bonded in accordance with local regulations and National Electrical Code. Ground main service to code size cold water pipe and driven ground rod, maximum of 2 driven rods. All conduits entering a free standing switchboard or motor control center shall be bonded together with approved grounding lugs and bare copper wire.

B. Interior metal water piping shall be bonded to the system ground as outlined in NEC Section 250-80.

C. This Contractor shall bond all metal air ducts to the respective unit grounding conductor. Install additional bonding jumpers at joints, flexible sections, etc., to insure that entire duct system is bonded.

3.6 Conduit Installation

A. Where rigid conduits enter boxes secure in place by approved lock nuts and bushings. Where E.M.T. enters boxes secure in place with approved insulated fittings. Conduit ends shall be carefully plugged during construction.

B. Use of running threads is absolutely prohibited. Conduits shall be joined with approved conduit couplings.

C. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 3" of such pipes except where crossings are unavoidable, then conduit shall be kept at least 1" from the covering of the pipe crossed.

D. Before installing raceways for motors and fixed appliances, check locations of motors and appliance connections. Locate and arrange raceways appropriately.

E. Provide flexible conduit connections to all motors and/or any equipment which has moving or vibrating parts. Sealtite flexible conduit shall be used in all cases where exposed to moisture and in mechanical equipment rooms.

F. Exposed conduit runs shall be parallel and/or at right angles to building walls and/or partitions.

G. Where conduit crosses a structural expansion joint, an approved conduit expansion fitting will be installed.

H. Leave aluminum pull wire in all empty conduit.

I. Conduit shall be cut square and the ends reamed after threading.

J. Fasten conduit securely in place by means of approved conduit clamps, hangers, supports, and fastening. Arrangement and method of fastening all conduits subject to Architect's direction and approval.

K. Apply two (2) coats of asphaltum paints to all underground rigid conduit. Carefully retouch any breaks in paint and allow to dry before covering. Leave exposed until after Architect's inspection.

L. Conduits shall be sized in accordance with National Electrical Code as amended to date, except when the size is shown larger on the drawings.

M. Conduit with an external diameter larger than 1/3 the thickness of the slab shall not be placed in the slab. Conduit in the slab shall not be spaced closer than 3 diameters on center. No conduit in porous fill.

N. E.M.T. may be used where concealed in ceiling or walls where there is no danger of mechanical injury. Rigid conduit shall be used , where embedded in concrete, areas exposed to moisture and danger of mechanical injury, in hazardous areas, and for feeders and motor circuits. PVC shall be allowed for branch circuit conduits installed in floor slab (rigid steel 90's).

3.7 Wire and Cable Installation

A. No conductor shall be smaller than #12 except where so designated on the drawings or hereinafter specified.

B. Joints and splices on wire shall be made with solderless connectors, and covered so that insulation is equal to conductor insulation. Wire nuts not permitted.

C. Multi-wire lighting branches shall be used as indicated.

D. No splices shall be pulled into conduit.

E. Both conductors and conduits shall be continuous from outlet to outlet.

F. No conductor shall be pulled until conduit is cleaned of all foreign matter.

G. In installing parallel conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size and type of conductor with the same insulation. Each group of conductors making up a phase or neutral must be bonded together at both ends in an approved manner.

3.8 Feeder Designation

A. Non-ferrous identifying tags or pressure sensitive labels shall be fastened securely to all cables, feeders and power circuits in vaults, pull boxes, manholes, switchgear and at termination of cables. Tags or labels shall be stamped or printed to correspond with markings on drawings so that feeder or cable number or phase can be readily identified.

3.9 Circuits and Branch Circuits

A. Outlets shall be connected to branch circuits as indicated on drawings by circuit number adjacent to outlet symbols, and no more outlets than are indicated shall be connected to a circuit.

3.10 Wire Joints

A. On copper wire larger than #12 joints shall be made with solderless connectors and covered with Scotch #33 Electrical Tape so that insulation is equal to conductor insulation. Connectors by Penn-Union or Anderson.

B. #12 and smaller wire joints shall be made with T & B Sta-Kon wire joints, complete with insulating caps, Ideal Wing nuts, or Buchannan Electrical Products Series 2000 pressure connectors complete with nylon snap-on insulators.

C. Joints on aluminum cable #0 and larger shall be made with compression lugs and bolted to terminals using stainless steel bolts and Belleville washers. Torque to 50 to 60 foot pound or torque with torque wrench. Aluminum cable and joints shall be used only where indicated on drawings. Connectors by Penn-Union or Anderson. Connection to panelboard by Burndy Connector and stud.

3.11 Outlet Boxes Installation

A. Outlet boxes shall be securely fastened.

B. Surface Fixture outlet boxes shall be set so edge of cover comes flush with finished surface.

C. There shall be no more knockouts opened in any outlet box than are actually required.

D. Boxes shall be sealed during construction. Protect interiors (including panel cans) from paint and mortar.

E. Unless otherwise shown, outlets shall be located as follows: centerline of boxes shall be following distance above the finished floor:

| | |
|---|---|
| Receptacles General | 1'4" - Centerline |
| Receptacles Over Counters | 3'8" - Centerline |
| Telephone Outlets General | 1'4" - Centerline |
| Wall Telephone Outlets | 4'0" - Centerline |
| General Clock Outlets | 7'6" - Centerline |
| Switches General | 4'0" - Top |
| Fire Alarm Pulls | 4'0" - Top |
| Fire Alarm Signals | 6'8" - Bottom |
| Bells | 6'8" - Centerline |
| T V & Computer Outlets | 1'4" - Centerline |

F. Symbols on drawings and mounting heights as indicated on drawings and in specifications are approximate only. The exact locations and mounting heights must be determined on the job and it shall be the Contractor's responsibility to coordinate with all trades to secure correct installation, i.e., over counter in or above back splashes, in stud walls, and other specific construction features. Mount all receptacles vertical. In block walls (exposed), use nearest joint as approved by Architect.

3.12 Fixture Installation

A. Support of all fixture shall be responsibility of this Contractor. Fixtures shall be supported independent of ceiling from structure members of building. Contractor shall submit typical hanging detail to Architect/Engineer before installing any fixtures. All grid fixtures shall be wired by flex individually to junction and not wired fixture to fixture.

B. Fixture conductors shall be connected by soldering and tying or by approved connectors.

C. All stems on fluorescent fixtures shall be installed as follows: except fixtures with slide grip hangers first and last stem in row in first knockout from end of fixture. One stem shall be installed between each two fixtures, stem shall center joint where fixtures join, and attach by use of "joining plates". All fixtures in continuous rows other than recessed grid type shall be connected by nipples with lock nuts and bushings.

D. Thoroughly clean all fixture lens and reflectors immediately prior to the final inspection.

3.13 Installation of Motors, Electric Heaters, and Controls

A. Provide feeders and make connections for motors, electric heating units and controls.

B. An approved H.P. rated safety switch shall be provided within sight of each motor and each heating unit. Provide fused switches where branch circuit fuses are not sized for overload protection. Weatherproof switches are to be used where switches are located outdoors. Safety switches shall be as manufactured by G.E., Square D, or Cutler Hammer.

C. Manual motor starters with thermal overload protection may be used in lieu of safety switches for motors under 1/2 H.P. Manufacturers shall be same as above.

D. The heating and air conditioning contractor shall furnish all motor starters.

E. The temperature control contractor shall furnish and install all low and line voltage wiring necessary for the temperature control systems and interlocking with air handling units, cabinet unit heaters.

F. The electrical contractor shall install all motor starters, except for factory mounted. He will furnish wire and disconnect switches. He will furnish and install all power wiring from the power panels on packaged equipment. He will not furnish nor install any low and line voltage wiring necessary for the temperature control system and interlocking with air handling units, or cabinet unit heaters.

3.14 Fire Alarm Installation

A. All wiring shall be in accordance with Local and National Codes and Article 210 of the National Board of Fire Underwriters Standard Number 72. Unless otherwise specified, minimum wire size shall be 12 gauge for A.C. and power supply connections, 14 gauge for audible alarm circuits and 14 gauge for signal initiating circuits, or wire size as indicated on drawings.

B. Wiring shall be run in conduit. In general, the wiring from the Control Panel shall consist of:

1. West Penn No. 995 shielded twisted pair common to all Fire Alarm stations or Detectors.

2. 4#14 wires common to each circuit of Fire Alarm Signals.

C. A factory trained representative for the manufacturer shall supervise the final testing of the system and it shall be subject to the approval and acceptance of the responsible engineer. On completing of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.

3.15 Sound System Installation

A. All wiring shall be in accordance with local and national codes.

B. Wiring shall be run in conduit except where accessible above lay-in ceilings.

3.16 Alterations & Additions to Electrical Systems in Existing Building

Work in existing building shall be performed as indicated or requested to perform its intended function on Electrical and Architectural plans. This contract shall include removing, relocating, extending, etc., any items of electrical nature required to facilitate work as indicated. All circuits interrupted by rework shall be extended and left energized. Contractor shall include night and weekend work in bid as required to keep all outages to a minimum four (4) hours, during non-school hours only.

END OF SECTION 16000

# PRE-CONSTRUCTION CONFERENCE CHECK-LIST

**Project:** **Classroom Addition to Margaret Elementary School**

**Funding:** **Local/PSCA**

**Location:** **TBD**

**Date/Time:** **TBD**

**DCM Insp:**

**Please note that all items listed below may not be applicable to this project.**

1. **Introductions / Sign In**

2. **Owner's Comments**

3. **Preface / Pass Along To Others**

4. **General Contractor's Team Members (contact information)**

   **Project Manager:** _____

   **Superintendent:** _____

5. Verify **all alternates accepted**.

6. **E-Verify. Alabama Immigration Law. Be sure that all subcontractors comply with E-Verify requirements.**

7. **List of Sub-Contractors, submit for approval.**
   A Complete list of sub-contractors must be submitted and approved by the Architect and Owner prior to any work commencing. Contractor cannot replace subs unless approved by the Architect and Owner (GCS 41)

8. **Cost Breakdown and Progress schedule.**
   Cost breakdown and progress schedule must be submitted and approved on proper state forms prior to first pay request. **GC is required to provide an updated progress schedule at each OAC.**

   Start: Completion Date: Days:

9. **Method of approving monthly pay request.**
   Due by the 25th of each month. Architect will verify, sign and forward to Owner, who will forward to DCM, if applicable.

10. **Allowances.**
    A. With the exception of quantity allowances, all allowances indicated are contingency allowances and therefore the Owner may transfer balances for other discretionary uses. Overhead and profit margins SHALL NOT BE ADDED to any amount drawn from original Allowance(s) regardless of the indicated use.

    B. Each contingency allowance shall be a "line item" on the Schedule of Values.

C. The following allowance(s) are a part of this project:

- 
- 

D. If applicable, note special material/equipment delivery dates associated with allowances.

- 

**11. Change Orders Requests. No work prior to final approval; Architect can approve in writing if emergency.**

A. All changes in work are to be submitted via Change Order Request, regardless of monetary value.

B. COR's must be submitted in sequential order on GC letterhead.

C. All COR's must be broken down to the fullest degree, including breakdown of GC's cost by GC's labor, materials, subcontractor, sub-subcontractor cost and OH&P. Subcontractor and sub-subcontractor cost must be documented with copies of quotes detailing OH&P included.

D. COR's applied to allowances cannot include OH&P.

E. Credit COR's must include a minimum of 5% OH&P.

F. Upon Owner and/or Architects' approval of COR's, a revised Change Order and Allowance Usage log will be sent to GC via email.

G. GC is to maintain a COR Log and present updated copy at each OAC meeting.

**H. NOTE: The following information is required for ALL Change Order Requests submitted:**

**a. Each material number shall include an invoice / quote listing unit quantities, unit price, and extended total.**

**b. Each labor number shall include a breakdown showing number of laborers, hours of labor worked, hourly wage, and extended total.**

**c. Each equipment number shall have an invoice / quote listing the hours of use, hourly rate, and extended total.**

**I. An official Change Order to the State CANNOT be prepared if all backup paperwork is not provided and accounted for.**

**J. This information is required for all contractors, subcontractors, and sub-subcontractors.**

**12. Shop Drawings.**

A. Submittal Schedule must be submitted to Architect at or before Pre-Construction Conference. Correlate this submittal schedule with the listing of subcontractors and with list of materials as specified in contract documents. The submittal schedule should be in chronological order following the critical timing of the approval of submittals in accordance with the Work Progress Schedule.

B. Submit all items proposed for use in work. Do not combine submittals with requests for substitutions

C. Must bear GC's action stamp as APPROVED OR APPROVED AS NOTED. Contractor shall review and stamp approval and submit shop drawings, product data and samples far enough in advance to allow ample time for Architect review. Color selections may take longer than actual submittal approval, but in any case will not be given via phone calls. If submittals are not marked as approved by the GC, they will be returned without action.

**D.** Digital Copies: Provide via email to submittals@lathanassociates.com. Do not send directly to Architect. **See attached Sample.**

E. Submittal Preparation:

- **Include the following information on transmittal / email.**
  - Date
  - Project Name and Architect's Project Number.
  - Name of the General Contractor and Contact within company.
  - Subcontractor/Supplier.
- Clearly state **Number** and title of appropriate Specification Section and **Description** of Item and if applicable
  - Name of the Manufacturer.
  - Model / Style of Item

General Contractor must review and approve shop drawings and submittals prior to submitting to Architect. Allow the Architect no less than three (3) weeks for initial review. Allow more time if the Architect must delay processing to permit coordination with the sequence of construction, related specification divisions, engineers, consultants and owner's representatives. Allow no less than two (2) weeks for reprocessing.

NOTE: No extension of Contract Time and/or additional costs will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

F. Material shall not be fabricated or work performed without approval of respective submittal.

G. GC is to maintain copies of all approved shop drawings at the site and have available for architect and/or engineers at all times.

**H. GC is to maintain a Submittal Log and present updated copy log at each OAC meeting.**

I. **Important:** Contractor shall perform no portion of the work for which the contract documents require submittal and review of Shop Drawings, Data, Installer Qualifications, etc. until respective submittal has been approved by the Architect.

J. **Important:** Submittals are not Contract Documents and are not used to make changes in scope of project or intent of Contract Documents, and not used to request or IMPLY substitutions or to otherwise make changes in project requirements.

K. **Important:** The only changes that can be made to the project once it is bid, is through Change Order Requests and Approvals.

L. **Important:** After receiving approved digital submittals, General Contractor is responsible for printing and delivering 2 hard copies of the approved shop drawings to the Architect within 10 days. Submittals are not considered complete until 2 copies have been received by the Architect. This may have a direct effect on pay requests or final payment.

**13. CAD Files / PDF**

A. This project was bid under the assumption that electronic CAD files would not be available.

B. Electronic CAD files are owned individually by each design professional according to discipline. If electronic CAD files or portions thereof are made available, be reminded that electronic CAD files can be manipulated and do not constitute the Contract Documents. The business of acquiring such files shall be between the contractor and the individual design professional. Fees may or may not be applicable. It shall be the Contractor's responsibility to investigate and procure at no added expense to the Owner.

C. PDF files shall be made available to the General Contractor for use during construction.

**14. Advanced notice of required inspections.**

The contractor will contact the architect by e-mail at inspections@lathanassociates.com of the date the project will be ready for an inspection by the DCM Inspector: Pre-Roofing, Fire Above Ceiling, Final, and Year End. Special Inspections shall be required for all work of the Storm Shelters and the Fire Water Lines. Schedule well in advance to prevent delays.

- Inspections must be requested 14 days in advance.
- When the DCM Inspector confirms the inspection time, the Architect will send an e-mail confirming the inspection time and date.
- Cancellations of any scheduled inspection must be received in writing by e-mail no less than 48 hours prior to the schedule inspection. If an inspection is cancelled, it will be rescheduled subject to the DCM Inspector's availability.
- If an inspection is cancelled less than 48 hours prior to the schedule inspection, the re-inspection fee of$1,500 will be charged.

**15. 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 Subcontractors
  - Inspection Requirements:
    - ✓ Signed construction contract
    - ✓ Verification of payment of permit fee
    - ✓ Contractor's Statement of Responsibility and Quality Assurance Plan (for storm shelter)
    - ✓ Fire Alarm Contractor's Certification (from State Fire Marshal)
    - ✓ ADEM permit, if more than 1 acre of land is disturbed

- Pre-Construction Conference for Storm Shelter
  - Required Attendees: Contractor, Owner, Architect, Structural Engineer, Major Subcontractors, Special Inspections Representative
  - Inspection Requirements:
    - ✓ DCM Inspector must have already received Contractor's Statement of Responsibility and Quality Assurance Plan

- Pre-Roofing Conference
  - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative
  - Inspection Requirements:
    - ✓ 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 roofing warranty

- Above-Ceiling Inspections
  - Required Attendees: Contractor, Owner, Architect, MEP Engineers, Major Subcontractors, DCM Inspector
  - Inspection Requirements:
    - ✓ 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 DCM Inspector
- ✓ Grease duct must be inspected and approved by the DCM Inspector prior to fire wrapping and Above-Ceiling Inspection

- Life Safety Inspections and Final Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers, Major Subcontractors, Local Fire Marshal, DCM Inspector
  - Inspection Requirements:
    - ✓ Fire alarm certification
    - ✓ Kitchen hood fire suppression system certification
    - ✓ General Contractor's 5-Year Roofing Warranty (ABC Form C-9)
    - ✓ Roofing manufacturer's guaranty
    - ✓ Above ground and below ground sprinkler certifications
    - ✓ Completed Certificate of Structural Engineer 's Observations for storm shelters
    - ✓ 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/Hot Water Heater exceeding 5 gallons Inspection completed and Certificate of Operation provided by State of Alabama Department of Labor
    - ✓ **Test and Balance Report previously accepted by Engineer**
    - ✓ Flush test for underground sprinkler lines (witnessed by local fire marshal, fire chief and/or DCM 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 Inspections
  - Required Attendees: Contractor, Owner, Architect, Engineers and /or Major subcontractors may also be required to attend
  - Inspection Requirements:
    - ✓ Owner 's list of documented warranty items

**16. Above Ceiling Inspection by the Architect, Engineers and DCM Inspector.**

No above ceiling work is to be done after the Above Ceiling Inspection other than correction of deficiencies noted during the inspection. (Pre-Above Ceiling Inspection)

Fire Caulking Tented fixtures Wire at Light Fixtures Debris
Temporary Lighting Penetrations Pipe Saddles
**Insulation - No Kraft - Exposed Fire-Rated FSK or FRK - Type III, Class A.**

**17. Other inspections required before work is covered.**

A. Local inspectors may require a full range of inspections on this project, footings, under-slab, etc. A wall inspection will be held before any finish paints are applied.

B. Material Testing.

**18. Observation report distribution.**

Architect will submit field reports promptly to the Owner, GC, DCM Inspector. Architect will fill in all blanks on the field report form.
(GCS 16 & MP 8D)

**19. Record drawings, definitions of procedures.**

G.C. is to keep all changes made in the field red lined daily. Cut and paste all addendums onto the

plans at their respected locations. One clean set of plans is to be secured at the job trailer at all times for review by all interested parties. This set with changes could be used as the record drawings. Final pay approval is subject to receipt of these as-built drawings.

**20. Project sign and other job signs.**
State required sign is the only sign allowed on project.
Job trailers with contractor and/or sub-contractor names are allowed.

**21. Overall phasing of project.**
Superintendent is responsible to plan ahead in order to avoid delays and conflicts. GC is to advise Architect on delays of critical path items. Superintendent is to be on site at all times when any work is in progress; no exceptions (GCS 6A & B)

**22. Contractor's duty to coordinate work of separate contractor.**
Contractors employed by others for installation of data, computer and etc. (GCS 40D)

**23. Use of existing site, building and access drive.**

A. Use of existing building site for lay down is to be determined by local owner and Architect. Local owner will advise contractor on proper route to site. Material delivery times are to be made as to not interfere with the school bus schedule. Area is to be reviewed after this meeting, if necessary. Maintain traffic flow.

B. No workmen are allowed in existing building, unless prior approval is granted by the Owner and arranged by the General Contractor. There is to be no communication between workers and faculty/staff or students; through vocal, looks, stares or body language.

C. Since most projects are hard hat areas, the worker's name will be on his/her hat for identification purposes.

D. If a faculty/staff member or student is causing a problem with a worker, the worker is to report the incident to the Project Superintendent. The Superintendent should then report the incident to the Owner. Under no circumstances should the Worker try and handle the problem by him/herself.

E. There is to be no profanity on the job site.

F. School Lunchroom is off limits to workers.

G. Use of existing site, building and access drive.

H. Workmen are expected to dress appropriately. Tee-shirts are expected to be non-offensive to all parties.

I. State school properties are tobacco free areas. No smoking, chewing, or dipping of tobacco products are allowed.

J. State school properties are drug free areas. Vehicles are subject to search and seizure by law enforcement authorities.

K. Firearms are not allowed on school property. Cased, uncased, loaded, or unloaded.

**24. Use of existing toilets.**
There will be no use of existing toilets. G.C. is to provide proper number of toilets for all workers. School telephone is off limits.

**25. Coordinate any utilities supplied by the Owner / New equipment.**

A. Existing sites, normally water only.
B. Coordination - OAC /Sub Meetings
C. New equipment utilities may be different than those existing utilities that the design is based upon. Coordinate with actual equipment cut sheets submitted and approved.

26. **Coordinate outages with Owner.**
Provide as much notice as possible. Superintendent is to verify that coolers and freezers are back on line. Coordinate with key testing date, do not disrupt on-going school operations. *Roofing fumes must be minimized with afterburner.*

27. **Keeping existing exit paths open.**
Required exits are to be maintained at all times.

28. **Routine job clean up.**
Debris is to be removed daily/weekly from building and site. Do not allow dumpster to spill over. Burning of trash on site is not allowed. (GCS 48, A & C)

29. **Safety is General Contractor's responsibility.**
As a courtesy, advise the Architect if there has been a problem.

30. **Project limits.**
Defined on drawings.

31. **Building location relative to critical property line. Easements, Setbacks, etc.**
Review with Architect before starting work.

32. **Location of property lines, corners, etc.**
Review with Architect before starting work.

33. **Verify sanitary outfall before committing to floor level.**
Plumber is to advise Superintendent ASAP and Superintendent is to notify Architect if there is a problem.

34. **Procedure if bad soil is encountered.**
Contact Architect immediately.

35. **Stockpiling top soil.**
On existing sites, location is to be approved by the Architect and Owner.

36. **Protect existing trees, shrubbery, landscaping, sidewalks, curbs and etc. if intended to remain.**
GC is to leave existing site in same condition as when project started.
***If disturbing more than 1 acre, discuss ADEM requirements.*

37. **Soil compaction, type soil, lab test, etc.**
Testing Engineer is to approve compaction. Soil type is listed in the specs. For lab tests, refer to the specs. Testing disclosure.

38. **Soil Treatment.**
Soil treatment provider is to come to the site with empty tank. Use on site water. Superintendent is to witness the treatment container seals broken and mix prepared. No pre-mixed material is to be brought to the site.

39. **Surveyor to check foundation wall. Location is critical.**

40. **Ready mix plant, file delivery tickets, slump and cylinder test.**
Protect cylinders until tested. Superintendent is to have on file, at all times, the delivery tickets, slump and cylinder test results.

41. **Quality of concrete work. Concrete testing.**
Concrete is to be free of hollows and humps. Finish floor areas are to be no more than 1/8" in 10'. Review specs for slump requirements. Do not add water to concrete without approval of Geotechnical personnel.

42. **Materials Testing / Re-testing**
**Retesting shall be the at the contractor's expense.**

43. **Inspection before pouring concrete.**
**Two (2) day notice is required before you pour footings.** Architect must approve all concrete placement. Pictures are not acceptable. Prior to footing inspection, all footings will be cleaned of loose soil, debris, and water. Steel is to be properly tied and supported.

44. **What is expected of masonry work, mortar additive.**
All masonry work shall be as stated in the specs. Full head and bed bull-nose outside corners. Joints are expected on both sides of the units. Pre-formed corner tees, durowall and flashing are required. Mortar mix shall be made with same proportions everyday throughout entire project, using appropriate measuring devices. For tooling of brick or block, refer to specs. No brick or block less than a half unit is allowed at any opening. Full head weeps at 32" on center. All substandard masonry will be removed. Cull blocks; do not lay chipped blocks. Cut holes for electrical outlet boxes the proper size; caulking and oversized plates are not allowed.

45. **Problems with hollow metal (install proper fire labels)**.
Do not paint fire labels. Labels will be attached; rating is to be embossed in minutes and/or hours. Specs require coating the interior of the frames. Grout frames solid.

46. **Pre-roofing conference. No roofing materials installed prior to conference.**
Contractor, manufacturer and applicable suppliers are required to be present.
Verify with DCM inspector if underlayment installation is acceptable prior to pre-roofing conference.

47. **Where new work is indicated to interface with an existing roofing system or other systems potentially under current warranty, the Contractor shall coordinate as required to verify and provide new work in such manner and with such resources as to maintain the Owners current warranty accordingly without compromise.**

48. **G.C. is to have copies of all required roofing warranties in hand at the final inspection.** i.e. Manufacturers' and DCM Five Year warranty issued by the General Contractor and the Roofing Subcontractor, (which is to be dated the date of the substantial completion), or final cannot be held.

49. **Potential conflict of mechanical and electrical equipment.**
It is the responsibility of the GC to coordinate the installation of all equipment where a conflict may occur. G.C., HVAC, Plumbing and Electrical subs are to read their sections of specs. Each foreman is to sign their section on the master copy, which is kept in the job trailer.

50. **Problems with fire damper installations.**
Installation of the dampers will be as shown on the plans. All other installation procedures will be unacceptable.
   A. Fire stop material; workmen must be certified to install firestop material. Firestop system must be a UL approved assembly. (See manufactures' manual).
   B. Stencil all fire walls, both sides every 20ft.

51. **Certificate of Substantial Completion.**

Architect will provide at the final inspection, provided contractor has copies of all roof warranties and the fire alarm certification.

**52. Project Closeout Procedures / Final payment.**

A. Warranties must be effective the Date of Substantial Completion. All warranties must identify the product covered.

B. Operating and maintenance manuals. All training required for the MPE fields will be completed prior to the final request being released.

C. As-built drawings.

D. Other requirements. G.C. is to make a list of all over-stocks that are required by specs and have at final for B.O.E. signature and acceptance.

E. Final Payment. Punch list items must be completed to the Architect and DCM Inspector's satisfaction, all close out documents must be received by the Architect, all change orders must be fully executed and Certificate of Substantial Completion must be fully executed before final payment is made. (GCS, 34A & B, MP 7 G4)

**53. Advertisement of Completion. Start ad after substantial completion.**

A. 1 week for projects valued less than $50,000.00.

B. 4 consecutive weeks for projects exceeding $50,000.00.

C. General Contractor is responsible for placement and payment of advertisement.

**54. Time Extensions.**

The GC can submit time extension request to the Architect on a weekly basis, with reasons for extension. Delays caused by rain, must exceed the five year average. (GCS 23).

**55. Quality Control.**

Urinals 17" A.F.F. Flush valves at wide side. Rigid conduit under slab. Fire strobes 80" to bottom, within 15' of exits.

**56. Requests For Information (RFI'S)**

A. All RFI's must be numbered and made in writing to the Architect's email **rfi@lathanassociates.com** by the General Contractor. Please include your name, company name, telephone number, and fax number so that we may respond appropriately. Verbal RFI's will not be answered. All RFI's must be in writing.

B. The Architect will not accept RFI's directly from subcontractors or vendors.

C. The Team List provided within the Specification Manual is for informational purposes only and should not be used to contact Engineers and/or Consultants directly with questions regarding the project.

D. All questions that need to be directed to an Engineer / Consultant must be routed through the Architect's office. If applicable, the Architect will contact the appropriate Engineer / Consultant for information.

E. Bids shall be based upon the official Contract Documents consisting of Plans, Specifications and Addenda. Architect assumes no responsibility for information used by Contractors outside the official Contract Documents.

F. **A RFI Log shall be kept by the Contractor and reviewed at each OAC Meeting.** It will be the contractor's responsibility to inform Architect of any outstanding RFI's in a timely manner.

**57. Liquidated Damages**

Liquidated damages will be strictly enforced for not reaching substantial completion by the

scheduled completion date. Liquidated damages will be deducted from the General Contractors final payment.

**58. Miscellaneous**: