

ARCHITECT'S JOB NO. 22-131

DATED: May 8, 2023

NEW GYMNASIUM FOR HAMILTON MIDDLE SCHOOL

OWNER

MARION COUNTY BOARD OF EDUCATION 188 WINCHESTER DRIVE HAMILTON, AL 35570

SCHOOL BOARD MEMBERS

DARYL WEATHERLY	District 1
JOYCE FOWLER	District 2
MARK DEAREN	District 3
DON JONES	District 4
BEVERLY BURLESON	District 5

ANN WEST

Superintendent



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TEAM LIST NEW GYMNASIUM FOR HAMILTON HIGH SCHOOL Architect Job No. 22-131

- OWNER: MARION COUNTY BOARD OF EDUCATION 188 Winchester Drive Hamilton, Alabama 35570
- ARCHITECT: LATHAN ASSOCIATES ARCHITECTS, P. C. 300 Chase Park South, Suite 200 Hoover, AL 35244 Phone: 205-988-9112 Contact: <u>RFI@lathanassociates.com</u>
- 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: WHORTON ENGINEERING, INC. 25 Summerall Gate Road Anniston, AL 36205
- ELECTRICAL: STEWART ENGINEERING 300 East 7th Street Anniston, AL 36202

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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. <u>General Contractors</u>

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 <u>distributed by the Architect</u> 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 <u>rfi@lathanassociates.com</u>. Please include your name, company name and telephone number, so that we may respond appropriately. **VERBAL RFL'S WILL NOT BE ANSWERED.** ALL RFL'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, <u>rfi@lathanassociates.com</u>. 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:	

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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 <u>customerservice@algraphics.com</u>.

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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.

Procedures for "Pre-bid Approval". If it is desired that a product, material, system, e. 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) <u>**Timely Notice:**</u> 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) <u>Substantial Mistake</u>: The mistake must be of such significance as to render the bid price substantially out of proportion to the other bid prices.

(3) <u>Type of Mistake</u>: 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 readvertisement 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

E-Verify MOU Instructions Revised August 2021



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 <u>https://www.e-verify.gov/employers/enrolling-in-e-verify</u>, 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: <u>Marion County Board of Education</u>	Date:
In compliance with your Advertisement for Bids and sub	pject to all the conditions thereof, the undersigned,
(Legal name	of Bidder)
hereby proposes to furnish all labor and materials and p	perform all work required for the construction of
WORK: New Gymnasium for Hamilton High School, Are	chitect's Job No. 22-131, in accordance with
Drawings and Specifications, dated, May 8, 2023, prepa	ared by Lathan Associates Architects, P.C., 300
Chase Park South, Suite 200, Hoover, AL 35244, Archit	tect.
The Bidder, which is organized and existing under the la	aws 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	a Partnership, list all partners and their addresses; if
Bidder is a Corporation, list the names, titles and busine	ess addresses of its Officers:
	· · · · · · · · · · · · · · · · · · ·
BIDDER'S REPRESENTATION: The Bidder declares that become fully informed regarding all pertinent conditions Specifications (including all Addenda received) for the V relative thereto; and that it has satisfied itself relative to	it has examined the site of the Work, having s, and that it has examined the Drawings and Work and the other Bid and Contract Documents o the Work to be performed.
ADDENDA: The Bidder acknowledges receipt of Adder inclusively.	nda Nos through
ALLOWANCES: The Bidder acknowledges by initials Section 01020 - Allowances and has included cost of s	ame in bid.
ALABAMA IMMIGRATION LAW COMPLIANCE: The comply with H.B. 56 - Alabama Immigration Law Comp	Bidder acknowledges by initialsthat he/she will liance.
BASE BID: For construction complete as shown and sp Dollars (\$)	pecified, the sum of
ALTERNATES: If alternates as set forth in the Bid Doc to be made to the Base Bid:	uments are accepted, the following adjustments are
Alternate No. 1: Weight Room and Storage	(add) \$
UNIT DDICES: See Attachment	

UNIT PRICES: See Attachment

Job No. 22-131

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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
(\$) r	nade payable to th	ne Awarding Authority.
BIDDER'S ALABAMA LICENSE: State License for General Contracting:			
	License Number	Bid Limit	Type(s) of Work
the Bidder as legally named, that this protect other bidder, that the information indica full accord with State law. Notice of ac below.	roposal is submitted ted in this document coptance may be se	in good faith with t is true and comp ent to the undersig	out fraud or collusion with any lete, and that the bid is made in ined at the address set forth
time subsequent to the receipt of bids a shall this time exceed twenty-four (24) h	as established by the hours after receipt of	Architect in the B	id Documents but in no event
Mailing Address			
* By (Legal Signature)			(Seal)
* Name & Title (print)			
Telephone Number			
Email Address			
* If other than an individual propr	rietor, or an above n	amed member of	the Partnership, or the above

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 & REP OF UNSUITABLE SOILS	PLACEMENT	\$ /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)

(Name/Title)

by_____ (Legal Signature)

WITNESS (to the above signature)

(Name/Title)

by_____ (Legal Signature)

Job No. 22-131

Proposal Form Attachment Page 3 of 3

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

To:	Marion Cour	nty Board of Education	Date	::
NAME C	OF PROJECT:	(Awarding Authority) New Gymnasium for Hamilt	on High School	
<u>SALES</u>	TAX ACCOU	NTING		
Pursuai	nt to Act 2013-	205, Section 1(g) the Contracto	or accounts for	r the sales tax NOT included in the bid
propos	al form as follo	WS:		ESTIMATED SALES TAY ANAQUNIT
				ESTIMATED SALES TAX AMOUNT
BASE BII	D:			\$
Alternat	te No. 1	Description Weight Room and Storage	(add)	\$
the det	ermination of	the lowest responsible and re	sponsive bidd	er.
Mailing	Address			
* By (Le	gal Signature)	•		
* Name	(type or print)			
* Title				(Seal)
Telepho	ne Number			
			<u></u>	

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.
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.

DCM (BC) Project No.

CONSTRUCTION CONTRACT

(2) (3)	This Construction Contract is entered into this between the OWNER , Entity Name: Address: Email & Phone #:	day of	in the ye	ar of
(4)	and the CONTRACTOR , Company Name: Address: Email & Phone #:			
(5)	for the WORK of the Project, identified as:			
(6) (7)	The CONTRACT DOCUMENTS are dated ADDENDA		and have l	been amended by
(8)	The ARCHITECT is Firm Name: Address: Email & Phone #:			
(9)	The CONTRACT SUM is			
(10)	Dollars (\$) and is the sum of the BID ALTERNATE PRICES :	Contractor's Base Bid for	the Work	and the following
(11)	The CONTRACT TIME is		() calendar days.
	THE OWNER AND THE CONTRACTOR AGR defined in the General Conditions of the Contract (DCN The Contractor shall perform the Work in accordance the Contractor will accept as full compensation for such additions and deductions (including liquidated damages shall commence on a date to be specified in a Notice to Division of Construction Management, and shall then be	EE AS FOLLOWS: The A Form C-8), are incorporate with the Contract Docum performance of the Work, as provided in the Contra o Proceed issued by the Ow substantially completed with	Contract I ents. The C the Contrac ct Docume ner or the I in the Contr	Documents, as by reference. Dwner will pay and ct Sum subject to nts. The Work Director, Alabama ract Time.
(12)	to pay the Owner in accordance with the Contract Do	cuments shall be equal to a	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 ______ on the dollars (\$______) per calendar day.

(1)

(13) SPECIAL PROVISIONS (Special Provisions may be inserted here, such as acceptance or rejection of unit prices. If Special Provisions are continued in an attachment, identify the attachment below:)

(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):

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

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

15)	APPROVALS	CONTRACTING PARTIES
	ByDate:	Contractor Company
	Governor (all State Agency projects except ABRFA)	BySignature
	By Secretary of State (Conservation projects only)	Name & Title
	By Add'l Agency, Title:	Owner Entity
-	ALABAMA DEPARTMENT OF FINANCE, REAL PROPERTY MANAGEMENT (RPM), DIVISION OF CONSTRUCTION MANAGEMENT (DCM)	BySignature Name & Title Additional Owner Entity signature space if needed:
	By Finance Director (Finance, sub-Finance & ABRFA projects only)	Owner Entity
	By	BySignature
	By DCM Director (all State Agency projects)	Name & 11te The Awarding Authority/Owner certifies that funds are available in the amount required for the Construction Contract.
	Reviewed By DCM Contract Administrator (all State Agency projects)	

Review/Signature flow: Architect/Engineer (prepare documents) > Contractor (review and sign) > Architect/Engineer (review) > Owner (review and sign) > RPM/DCM (review and sign) > Finance-Legal > (> Finance, Finance sub-Agencies & Alabama Building Renovation Finance Authority [ABRFA] projects then go to Finance Director [review and sign]) > Governor (review and sign) (> Conservation projects then go to Secretary of State [review and sign]) > DCM (distribute fully executed Contract to all parties along with a Notice to Proceed). Note: Transportation inserts an additional signature sheet.

Bid Limit:

(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 Name: Address:	he Construction Contract)
(3)	The SURETY (Company name and primary place of business) Name: Address:	
(4)	The OWNER (Entity name and address, same as appears in the Construction Name: Address:	Contract)
(5)	The PENAL SUM of this Bond (the Contract Sum)	Dollars (\$).
(6)	DATE of the Construction Contract :	
(7)	The PROJECT : (Same as appears in the Construction Contract)	
	1. WE, THE PRINCIPAL (hereinafter "Contractor") AND THE hereby bind ourselves, our heirs, executors, administrators, succ the Penal Sum stated above for the performance of the Contra accord with the requirements of the Contract Documents, which a If the Contractor performs the Contract, and Contract Chan Contract Documents, then this obligation shall be null and voi force and effect.	IE SURETY , jointly and severally, sessors, and assigns to the Owner in ct, and Contract Change Orders, in are incorporated herein by reference. ge Orders, in accordance with the id; otherwise it shall remain in full
	2. The Penal Sum shall remain equal to the Contract Sum as the C Change Orders. All Contract Change Orders involving an incre consent of Surety by endorsement of the Contract Change notification of any Contract Change Orders involving only extens	Contract Sum is adjusted by Contract ase in the Contract Sum will require Order form. The Surety waives sion of the Contract Time.

Page 1 of 3

- 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.

- **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.

SIGNED AND SEALED this ______ day of ______, _____.

(9 & 10) **SURETY:**

By

(8)

CONTRACTOR as PRINCIPAL:

Company Name

Ву _____

Name and Title

Signature

Name and Title

Signature

Company Name

(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.

(1)	PAYMENT BOND	SURETY'S BOND NUMBER
	Do not staple this form; use clips.	
(2)	The PRINCIPAL (Company name and address of Contractor, same as appead Name: Address:	rs in the Construction Contract)
(3)	The SURETY (Company name and primary place of business) Name: Address:	
(4)	The OWNER(s) (Entity name and address, same as appears in the Construction Name: Address:	on Contract)
(5)	The PENAL SUM of this Bond (the Contract Sum)	ollars (\$).
(6)	DATE of the Construction Contract:	
(7)	The PROJECT : (Same as appears in the Construction Contract)	
	1. WE, THE PRINCIPAL (hereinafter "Contractor") AND TH hereby bind ourselves, our heirs, executors, administrators, succ the Penal Sum stated above to promptly pay all persons supplyin in the prosecution of the Contract, which is incorporated herein thereof by Contract Change Orders. If the Contractor and in persons supplying labor, materials, or supplies for or in the prose Change Orders, then this obligation shall be null and void; othe and effect.	IE SURETY , jointly and severally, essors, and assigns to the Owner in g labor, materials, or supplies for or by reference, and any modifications is Subcontractors promptly pay all ecution of the Contract and Contract rwise to remain and be in full force
	2. The Penal Sum shall remain equal to the Contract Sum as the C Change Orders. All Contract Change Orders involving an incre consent of Surety by endorsement of the Contract Change notification of any Contract Change Orders involving only extens	ontract Sum is adjusted by Contract ase in the Contract Sum will require Order form. The Surety waives sion of the Contract Time.

Page 1 of 2

- 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	2	
-----	-------------------	------	--------	---	--

(9 & 10) SURETY:

CONTRACTOR as PRINCIPAL:

By_

Signature

Name and Title

Company Name

Company Name By

Signature

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 Act 2001-955)

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:
Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any Stat 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.
Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any Star 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, 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/AGENC

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		NAME OF PUBLIC OFFICIAL/	STATE DEPARTMENT/
FAMILY MEMBER	ADDRESS	PUBLIC EMPLOYEE	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.

DCM (BC) No. _____

PSCA Projects: PSCA No.

Application No.

Date: _____

DCM Form C-10 Revised July 2022

APPLICATION and CERTIFICATE for PAYMENT

Attach DCM Form C-10SOV: Schedule of Values

TO OWNER:	PROJECT	
Entity Name:	FROJECT	
Address:		
EDOM CONTRACTOR: Company Name & Address which must worth worth	ADCULTECT (ENC	NICED.
co. name & payment	ARCHITECT / ENG	INEEK:
address spelling as	Firm Name:	
of AL Accounting	Address:	
& Resource System		
to avoid rejection:		
STAARS or AL Buys Vendor#:		
A. Total Original Contract		\$
B. Fully Executed (fully signed) Change Order(s) Numb	ers through	+\$
C. Total Contract To Date		\$
		Ψ
1 Work Completed to Date you attached Schedule of	Values (Form C-	10SOV's ¢
1. work Completed to Date per attached Schedule of	values Column F	Total)
2. Materials Presently Stored (When this amount is greater the C-10SM: Inventory of Stored M	an \$0.00, attach Form aterials, or similar lis	// +\$
3. Total Work Completed to Date & Materials Presently St	tored (% of Co	ntract To Date) \$
4. Less Retainage or equal to 50% of Total Contract to Date (C), Reta Once #1 exceeds 50% of C and up until project is co	inage = #3 x 0.05. milete Retainage = C	-\$ Final pay ap
5. Total Due	bullet point below instru	uctions.) \$
6 Loss Total Provious Payments Pilled (Must exactly ma	atch #5 Total Due from	n previous
6. Less fotal Frevious Payments Billed payment applica	nt application)	
7. Balance Due This Estimate		\$
CONTRACTOR'S CERTIFICATION	ARCH	ITECT'S / ENGINEER'S CERTIFICATION
The undersigned Contractor certifies that to the best of his knowledge, information	tion, and In accord	lance with the Contract Documents, the Architect/
belief the Work covered by this Application for Payment has been com	pleted in Engineer c	certifies to the Owner that, to the best of the Architect's/
Work for which previous Certificates for Payments were issued and payments	received point indic	cated herein, the quality of the Work is in accordance with
from the Owner and that current payment shown herein has not yet been recei	ved. the Contra	ct Documents, and the Contractor is entitled to payment of
	the amoun	t approved.
By: Date:		
Contractor's Signature	By	
Name & Title	D;	Architect's / Engineer's Signature
Sworn and subscribed before me this day of		
Seal: Day Month, Year	Name &	Title
	Data	
Notary Public's Signature	Date	
INSTDUCTIONS		APPROVAL
PSCA-funded projects, and State Agency-owned projects: Two copies of pay	7. app.,	
 each with original signatures and all attachments required. Date of first payment application cannot precede the Notice to Proceed's Required. 	n Date	
 Pay, app. must exactly match an attached DCM Form C-10SOV: Schedule of V 	/alues.	Owner Entity
• A change order must be fully executed before inclusion on a payment application	on.	Carlo Dany
Contractor is signature date cannot precede the payment application date. Contractor and Notary signee dates must match.	By	
Progress schedules must be included with non-final payment applications.		Signature
 One payment application per month may be submitted. On a final payment application, the following is required for release of retained. 	e: all	
change orders must be fully executed (signed by all parties and approval authorities	ities) and Name	e & Title
included in B., the Certificate of Substantial Completion for entire work is fully and all other close-out requirements are General Conditions Article 34 are con-	executed,	
and an other close-out requirements per Ocheral Conditions Article 34 are comp	Date	

SCHEDULE OF VALUES (SOV)						DCM Revis	Form C-10SOV sed October 2021		
Project	•					DCM (BC) Proj	ect Number:	1000000000000	
					n an tha	PSCA Project N	umber, if any:	a da serie da serie Serie da serie da ser	
Contra	ctor Company:					Application Nur	nber:		Elization and the second
						Application Date	e:		
						Period From:	المراجع المراجع المراجع المراجع	Period To:	
A	B	C	D	Е	F	G	Н	I	J
Item No.	Description of Work	Scheduled Value (including fully executed [signed by all parties] change order amounts)	Work Co Work Previously Completed (Previous pay app SOV's column F. D is \$0 if this SOV is for first pay app.)	mpleted 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 S0 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
2.					\$-		\$ -		Variable Rate:
3.					\$ ~		\$ -		
4.					\$ -		\$ -		If Total Work
5.							<u> </u>		Date & Materials
6.							s -		Presently Stored
/.				<u>.</u>	\$ <u>-</u>		s		(H) is less than or
<u>ð.</u>					8 -		\$		equal to 50% of
$\frac{7}{10}$					\$ -		\$	<u></u>	Total Scheduled
11				1	s -		\$ -		Value (C),
12.					\$ -		\$ -		Retainage =
13.					\$ -		\$-		ri x 0.05.
14.					\$-		\$-		Once H exceeds
15.					\$ -		\$ -		50% of C and up
16.					\$ -		\$ -		until project is
17.					<u>s</u> -		\$-		complete,
18.	······································				<u>s</u> -		\$ -		Retainage =
19.	······	4			<u> </u>		-		C x 0.025.
20.							5		There will be no.
21.		ļ			<u> </u>		<u> </u>	<u> </u>	retainage on final
22.					<u> </u>		5 - ¢	1	payment
23.					- -		\$	ļ	application.
24.					<u> </u>		\$		4
<u>~</u> J.					\$				
	TOTALS:	s -	\$ -	s -	<u>s</u> -	s -	\$ -		s -
This pay	app SOV's column totals must match amounts in this pay	1	1						
app Forr	n C-10 per the following indicated Form C-10 line #s:	C.	None	None	1.	2.	3.	3.	4.
					المتبع وتركيب ومرود ومراكز والمركز والمركز		and the second secon	de <u>terrest</u> er en segundentes Alterrester de la constantes de la constante de	المتعلق تعاقب في والمعاصر المسالم
Note: I	f this SOV's column G: Materials Presently Stored in the payment application documentation	cludes any amour	its other than \$0, th	en DCM Form C	-10SM: Inventory	of Stored Materia	ls with back-up re	eceipts must b	e submitted as

INVENTORY OI		DCM Form C-10SM Revised October 2021				
Project:			DCM (BC) No.:			
	PSCA No, if any:					
Contractor Company:			For Estimate No.:			
	For Period Ending:	e e e e e e e e e e e e e e e e e e e				
А	В	С	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)		
· · · · · · · · · · · · · · · · · · ·		. · · · · · · · · · · · · · · · · · · ·				
TOTALS:						
 Instructions: This Form C-10SM must be submitted as part of the payment a than \$0 is noted on line 2 of DCM Form C-10: Application and Receipts must be provided as attachments to this form C-10SM The total \$ amount of this Form C-10SM's column E: Material Form C-10SOV: Schedule of Values' total \$ amount of Column The \$ amounts in this current Form C-10SM's Column D: Material application's Form C-10SOV's Column E: Work Completed The \$ amounts in this current Form C-10SM's Column E: Material Form C-10SM's Column B: Materials Stored Last Period. 	application documentatio d Certificate for Payment f for all amounts placed i s Presently Stored must r n G: Materials Presently erials Used This Period a his Period. erials Presently Stored ar	n when a Materials Preser n Column C: Materials Pr natch both Form C-10's li Stored. re amounts that must all t e the amounts that must b	ntly Stored amount of anyt urchased This Period. ne 2: Materials Presently S be included in the current p e listed in the next paymen	hing greater Stored, and Payment t application's		

SAMPLE PROGRESS SCHEDULE & REPORT DCM (BC) No.:					CONTRACTOR (Contractor may use own form in lieu of			DATE OF REPORT:						
					Form C-11):									
PSCA projects: PSCA No.:							PROCEED DATE:							
PRO	IECT:													
					ARCHI	rect/engine	ER:			PROJECTED COMPLETION DATE:				
 		0/	AMOUNT	.	1				1			T		1
	CENIEDAL DECHIDEMENTS	70	Amoon								-			
$\frac{1}{2}$	SITEWORK											++		
2.				-								++		
<u> </u>	MASONIPY										-	+		
5	METALS											++		
5.				_							-			100%
7	THERMAL AND MOISTURE										-			
1	PROTECTION													90%
8.	DOORS AND WINDOWS													80%
9.	FINISHES			-										70%
10.	SPECIALTIES					1								60%
11.	EQUIPMENT													50%
12.	FURNISHINGS													40%
13.	SPECIAL CONSTRUCTION	1												30%
14.	CONVEYING SYSTEMS													20%
15.	MECHANICAL													10%
16.	ELECTRICAL													0%
TOT	AL ORIG. CONTRACT	100%												
ANT	ICIPATED DRAW IN \$1,000													
ACT	JAL DRAW IN \$1,000													Aug
														orm
			••••••••••••••••••••••••••••••••••••••				USE ADDITIONAL SHEETS IF JOB IS		۲ 20					
LEGI	ND: ANTICIPATED ACTIVITY	ACTL	IAL ACTIVITY	ANTIC	IPATED (CASH FLOW	ACTUA	L CASH FL	0W	SCHEDU	LED OVER 3	2 MONTHS.		11 21

CONTRACT CHANGE ORDER

Change Order No	Date	DCM (BC) No
TO: (<i>Contractor</i>) Co. 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.):

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

	CONTRACTING PARTIES
Architectural/Engineering Firm	
Recommended By	Contractor Company
Name & Title	Ву
	Name & Title
APPROVAL	Awarding Authority/Owner Entity
ALABAMA STATE DEPARTMENT OF EDUCATION	By
(SDE) (Required for locally-funded, SDE projects.)	CONSENT OF SURETY (for additive \$ change orders only)
By Date: State Superintendent of Education	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) > Owner (review and sign) > SDE (review, sign, distribute the fully executed Change Order to all parties and forward a copy to the Alabama Division of Construction Management [DCM]). Note: DCM does not sign fully locally-funded SDE project contract documents.

Real Property Management		CHANGE ORDER JUSTIFICATIO				
0 Wa	Ishington Avenue, Suite 444 Imery Alabama 36104	Change Order No				
34) 242-4082 FAX (334) 242-4182		Date:				
	Purpose and instructions on next page. Do not stable this form and/or attachments: use clips	DCM (BC) No.				
A)	PROJECT NAME & LOCATION:	OWNER ENTITY NAME & ADDRESS:				
	CONTRACTOR COMPANY NAME & ADDRESS:	ARCHITECTURAL / ENGINEERING FIRM NAME & ADDRESS:				
3)	DESCRIPTION OF PROPOSED CHANGE(S): ATTA	CH CONTRACTOR'S DETAILED COST PROPOSAL(
C)	AMOUNT: ADD DEDUCT \$ ORIGINAL CONTRACT AMOUNT PREVIOUS C.O.'s	TIME EXTENSION: CALENDAR DAY CONTRACT AMOUNT PRIOR THRU PROPOSED CHANGE ORDER				
כ)	\$	= \$				
=)	JUSTIFICATION OF CHANGE ORDER VS. COMPETITIVE BID.					
⁼)	ARCHITECT / ENGINEER'S EVALUATION OF PROPOSED COS	Т:				
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:				

TO: Alabama Department of Finance

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 <u>proposed</u> 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	DCM (DC) Project No
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: LATHAN ASSOCIATES ARCHITECTS, P.C. 300 Chase Park South, Suite 200 Hoover, AL 35244 Architect's Job No.:	General Contractor's Name, Address, and Phone No.:
EFFECTIVE DATES OF GUARANTEE: Star	t: 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

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 (BC) No.

CERTIFICATE OF SUBSTANTIAL COMPLETION

ROUTING PROCEDURES ON NEXT PAGE

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 forthe ent	ire 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 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.

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:
	1

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. <u>Provide Owner</u> 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 <u>field office address</u>; 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			7
(Contract	or Company Name)		
Contractor, has completed the Contract for [[(Equipment) [(Improvement) of	(Construction) (Na	(Renovation) me of Project):	(Alteration)
at			
(Insert location	data in County or Cit	y)	
for the State of Alabama and the (County) (C Owner(s), and have made request for final set any claim for labor, materials, or otherwise in notify	ity) of	ontract. All perso this project should	ns having immediately
(Archit	tect / 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 (<i>Entity name and address</i>):	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

Seal:

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:

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 PROJECT SIGN

N.T.S.

8'-0"



Notes:

 Fully locally-funded State Agency, Public University and ACCS 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.

- 2. Sign to be constructed of $\frac{3}{4}$ " exterior grade plywood.
- 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.
- 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.

GENERAL CONDITIONS of the CONTRACT

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- 3. Contractor's Representation
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- 6. Supervision, Superintendent, & Employees
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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, <u>Code of Alabama</u>, 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. <u>INTENT</u>

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. <u>COMPLEMENTARY DOCUMENTS</u>

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. <u>SEVERABILITY</u>.

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. <u>SUPERVISION and CONSTRUCTION METHODS</u>

(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. <u>SUPERINTENDENT</u>

(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. <u>EMPLOYEES</u>

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. <u>DEVIATIONS</u>

(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. <u>CONFORMANCE with SUBMITTALS</u>

The Work shall be constructed in accordance with approved Submittals.

ARTICLE 10 DOCUMENTS and SAMPLES at the SITE

A. <u>"AS ISSUED" SET</u>

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. <u>"POSTED" SET</u>

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. <u>RECORD SET</u>

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. <u>GENERAL</u>

(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. <u>TYPES of INSPECTIONS</u>

(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. <u>SPECIFIED INSPECTIONS and TESTS</u>

(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. <u>GENERAL</u>

(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 contractorowned;

(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. <u>DEFINITION</u>

"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. <u>PROCEDURES</u>

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. <u>APPLICABILITY of ARTICLE</u>

(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. <u>TERMINATION by the OWNER for CAUSE</u>

(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 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 reasonable

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. <u>NONPAYMENT</u>

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 $8.5^{\circ} \times 11^{\circ}$ 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. <u>APPLICATIONS for PAYMENTS</u>

(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. <u>RETAINAGE</u>

(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. <u>UPON SUBSTANTIAL COMPLETION</u>

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. <u>ADVERTISEMENT for COMPLETION</u>

(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. <u>RELEASE of CLAIMS</u>

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. <u>ONE-YEAR WARRANTY</u>

(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 of the Certificate of Substantial Completion of the Certificate of Substantial Completion of the 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 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. <u>GENERAL</u>

(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
- (I) 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 selfinsurer 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

COMMERCIAL GENERAL LIABILITY INSURANCE (2)

(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	Products, Completed Operations Aggregate
.3	Personal and Advertising Injury

.4 Each Occurrence

\$ 2,000,000.00 per Project \$ 2,000,000.00 per Project \$ 1,000,000.00 per Occurrence \$ 1,000,000.00

- (b) Additional Requirements for Commercial General Liability Insurance:
 - 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.

COMMERCIAL UMBRELLA OR COMMERCIAL EXCESS LIABILITY INSURANCE (4) (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 <u>Combined</u> 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 as

(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, subsubcontractors, 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. <u>GENERAL</u>

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. <u>PERFORMANCE BOND</u>

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. <u>CHANGE ORDERS</u>

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. <u>EXPIRATION</u>

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. <u>COORDINATION</u>

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. <u>PERMITS, FEES AND NOTICES</u>

(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. <u>TAXES</u>

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, <u>Code of Alabama</u>, 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 patenteils, 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. <u>IN-PROGRESS CLEAN-UP</u>

(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. <u>OWNER'S RIGHT to CLEAN-UP</u>

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. <u>Fully locally-funded State Agency and Public Higher Education projects</u>: 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.** <u>Fully locally-funded K-12 school projects</u>: 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. <u>Partially or fully PSCA-funded projects</u>: 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 PSCAfunded 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.

<u> 1.0 - GENERAL</u>

1.1 <u>Summary</u> A. Thi

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 <u>Definitions</u>
 - 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 <u>Procedures</u>
 - 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 <u>Schedule:</u>

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:

Alternate No. 1 - Weight Room and Storage Room (additive):

The amount to be added to Base Bid for construction and associated Plumbing, Mechanical, and Electrical work required for the Weight Room and Storage as indicated on the construction documents.

END OF SECTION

<u> 1.0 - GENERAL</u>

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 <u>Submittals</u>
 - 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 <u>Contingency Allowances</u>
 - 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:

3.

- 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".
- 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.
 - <u>Overages:</u> Contractor shall submit to the Architect all costs associated with <u>prior</u> <u>approved</u> 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 <u>Inspection</u> 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

<u>Allowance No. 1</u>: Include a contingency allowance of \$30,000.00 for the Owner's use throughout the project for unforeseen conditions as directed by the Architect.

<u>Allowance No. 2</u>: 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.

<u>Allowance No. 3:</u> Include a quantity allowance of 2,400 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.

<u>Allowance No. 4</u>: Include a contingency allowance of \$10,000.00 to provide Fire Department Radio Transponder.

<u>Allowance No. 5</u>; Include a contingency allowance of \$5,000.00 as an AID -to-Construction for utility fees.

<u>Allowance No. 7</u>: Include a quantity allowance under base bid for providing an additional 1/2 ton of in-place miscellaneous steel system construction, not otherwise indicated, to be fabricated, primed, and installed at the direction of the architect. This steel may be used throughout the project at multiple locations of any divisible quantity denomination or location, including but not limited to: finished railings, clip angles, embeds, stair components, etc.

END OF SECTION

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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 <u>Project / Work Identification</u> Project name is New Gymnasium for Hamilton Middle School

- A. <u>General Description:</u>
 - 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 storefront system, standing seam roof on preengineered structural metal frame, interior concrete block wall and paint finish, acoustical tile ceiling, hard tile floor and wall finishes, VCT and composite gym floor finishes, plus plumbing, mechanical and electrical work as required to perform the work under this Contract for <u>Hamilton</u> <u>Middle School</u> 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 <u>May 8, 2023</u>.

- 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. <u>Contractor's Duties:</u> 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.
 - 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.

- 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. <u>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.</u> 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. <u>Related Contract Documents:</u>

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

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 01025 2

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 <u>Contractor's Use of Premises:</u>

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 <u>immediate use</u> (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. <u>General</u>:

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. <u>Alterations</u>;

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

C. <u>General:</u>

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 <u>Miscellaneous Provisions (to include, but not be limited, by the following):</u>
 - A. Provide all rough-in and utility connections for all Owner Furnished Equipment, and all new plumbing fixtures 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 <u>mandatory</u>.
 - E. Mechanical / Electrical Requirements of General Work:
1. <u>General</u>:

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. <u>Electrical Requirements:</u>

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 <u>Utilities for Construction:</u>

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 Contractor shall pay for utility usage bills.
- 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 <u>normal sequence</u> 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. <u>Temporary Electrical Lighting and Power</u>:

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 threephase 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 <u>Requirements of Separate Contractors</u> 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. <u>Before final payment will be made to a Separate Contractor, he must have settled with the building General Contractor for any damage done</u>.
 - 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 <u>from the site</u>.
 - 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. <u>Shop Drawings and Product Approval</u>: 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. <u>Material Approval:</u> Compliance with SUBMITTALS - SECTION 01350 for submittal of products for approval by Architect before delivery of same to jobsite.
 - C. <u>Qualifications of Workmen:</u> 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 <u>N.I.C. Items</u>:

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 by <u>June 28, 2024</u>. 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

<u>OWNER</u>

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:

MARION COUNTY BOARD OF EDUCATION 188 WINCHESTER DRIVE HAMILTON, AL 35570

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. <u>Codes</u>
 - 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.
- C. <u>Authorities, including but not limited to:</u>
 - 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.

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 <u>Pre-Construction Conference</u> <u>Checklist</u> 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 <u>must</u> 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. <u>Bar-Chart Schedule:</u> 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. <u>Cost Correlation</u>

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. <u>Distribution</u>

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

Job No. 22-131

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	
\$750,000 and up	Cost of the Work minus \$750,000 =/1000 x \$2.00 x \$2	

INSPECTIONS

Scheduling - The contractor will contact the architect by e-mail at <u>inspections@lathanassociates.com</u> 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
 - o Inspection Requirements:
 - Signed construction contract
 - Verification of payment of permit fee
 - Fire Alarm Contractor's Certification (from State Fire Marshal)
 - ADEM permit, if more than 1 acre of land is disturbed
- Pre-Roofing Conference
 - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative, DCM Inspector
 - o 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
 - o 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
 - 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. <u>Protection of Work and the Public</u>

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 <u>quite visible</u> 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. <u>Unauthorized visitors not permitted within working and storage areas.</u> OSHA approved suitable personal safety devices are to be provided for <u>authorized visitors</u> 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.
- 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. <u>Contractor to pay for any sewer impact fee</u> <u>as related to this project.</u> 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 <u>before starting work</u>. 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. <u>Maintain and protect existing utilities</u>.
- 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 <u>General Contractor is responsible for the repair, replacement and finish of pavement, roofs, floors, walls and ceiling (all finish work)</u>; 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.

<u>FIRE INTEGRITY OF CONSTRUCTION</u> 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

Job No. 22-131

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:
 - 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 <u>and any equipment within that area used by the Owner</u>, 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.

GEOTECHNICAL INVESTIGATION ENTITLED:

"GEOTECHNICAL ENGINEERING REPORT" TERRACON PROJECT NO. E1235010

was prepared by: Terracon Consultants, Inc. - 2147 Riverchase Office Road, Birmingham, AL 35244.

The General Contractor and Subcontractors are responsible for familiarizing themselves with geotechnical information, for visiting the site, ascertaining the conditions thereof, and conditions under which work is to be done. The General Contractor shall include in their bid the cost of meeting the requirements and conditions of the geotechnical investigation.

A copy of this report immediately follows this Section.

END OF SECTION

Hamilton Middle School Gymnasium

211 Aggie Avenue

Hamilton, Alabama

Geotechnical Engineering Report

March 28, 2023 | Terracon Project No. E1235010

Prepared for:

Marion County Board of Education 188 Winchester Drive Hamilton, AL 35570







- # Facilities
- Environmental
- Geotechnical
 Materials



2147 Riverchase Office Road Birmingham, Alabama 35244 P (205) 942-1289 Terracon.com

March 28, 2023

Marion County Board of Education 188 Winchester Drive Hamilton, AL 35570

Attn: Ms. Ann West - Superintendent P: 205-921-3191

Re: Geotechnical Engineering Report Hamilton Middle School Gymnasium 211 Aggie Avenue Hamilton, AL Terracon Project No. E1235010

Dear Ms. West:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PE1235010 dated January 12, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and other site development elements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Samuel E. Brancheau, P.E.

Bryan C. Ritenour, P.E.

Project Engineer

Senior Engineer

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Figures

GeoModel

Attachments

Exploration and Testing Procedures Site Location and Exploration Plans Exploration and Laboratory Results Supporting Information

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Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **Ferracon** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

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Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed gymnasium at Hamilton Middle School, located at 211 Aggie Avenue in Hamilton, AL. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction

The geotechnical engineering Scope of Services for this project included the advancement of 6 test borings, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the Site Location and Exploration Plan, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs in the Exploration Results section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The site location and schematic plans were provided by Mr. Shawn Calma of Lathan Associates.
Project Description	The project will consist of an approximate 10,000 SF gymnasium, with associated locker rooms, bathrooms, and weight room.
Proposed Structure	A new gymnasium
Building Construction	Metal-frame construction, concrete slab-on-grade

Geotechnical Engineering Report

Hamilton Middle School Gymnasium | Hamilton, AL March 28, 2023 | Terracon Project No. E1235010



Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the structural loading and grading assumptions, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is located at the existing Hamilton Middle School in Hamilton, Marion County, Alabama, within the grass field adjacent northeast of the intersection of Aggie Ave and State Highway 17. Latitude/Longitude (approximate) 34.1380° N, 87.9909° W (See Exploration Plan)
Existing Improvements	None; The site is located in a grass playfield adjacent to the school building
Current Ground Cover	Grass
Existing Topography	Relatively level

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Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the Exploration Results and the GeoModel can be found in the Figures attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer Nam	e General Description
1 Topsoil	Dark brown, generally 6 to 7 inches, with a 3-foot thick section at Boring B-3
2 2 Soils	t Generally brown, soft native clays and very loose to loose native sands. Contains trace topsoil
Residual 3 Sands and Clays	Variable colors, includes stiff to hard clays (CL/CH) with variable sand and gravel content, and medium to very dense sands (SC/SM) with variable fines and gravel content

The borings were advanced in the dry using a hollow stem auger drilling technique that allows short term groundwater observations to be made while drilling. Groundwater seepage was encountered during drilling at the location and depth indicated in the table below.

Boring	Depth to Groundwater Observed During Drilling (feet)
B-1 B-3	16

Groundwater was not observed at any of the other borings during drilling or during the relatively short period the borings remained open prior to being backfilled. Groundwater conditions may be different at the time of construction. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling. Seepage should be anticipated within the deeper topsoil deposit and very loose sands present in the vicinity of B-3. As such, the grading contractor should plan for temporary dewatering measures during undercutting. Long-term groundwater monitoring was outside the scope of services for this project.

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Site Geology

Published geologic maps indicate the site is located within the Fall Line Hills District of the East Gulf Coastal Plain Physiographic Section, and is underlain by the Pennsylvanianaged Pottsville Formation (lower part). The lower Pottsville Formation consists of light-gray, thick-bedded to massive pebbly quartzose sandstone, containing varying amounts of interbedded dark-gray shale, siltstone, and thin discontinuous coal.

Alluvial, coastal, and low terrace deposits are mapped on the south side of Highway 17, adjacent to the project site. These deposits consist of varicolored fine to coarse quartz sand containing clay lenses and quartz and chert gravel.

Based on findings of the borings, the site is most likely underlain by the Alluvial, Coastal, and low terrace deposits.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties observed at the site and as described on the exploration logs and results, our professional opinion is that a **Seismic Site Classification of D** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 20 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

The site can be suitably prepared for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations (i.e., undercutting and replacing the soft/loose soils) in this report are implemented in the design and construction phases of this project.

Beneath the topsoil layer, all borings encountered low consistency/relative density soils extending to a depth of about 3 feet below existing grade. However, in boring B-3, the topsoil thickness was about 3 feet, and the soft/loose soils extended to a depth of about

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8 feet. In general, these upper loose and soft soils were brown-gray and consisted of clayey sand (SC) and sandy lean clay (CL).

Stiff or better clays (CL/CH) with variable sand and gravel content, and medium dense or better sands (SM/SC) underly the upper soft/loose layer and extended to the boring termination or auger refusal depths, ranging from 17 to 20 feet below ground surface.

The low consistency, low relative density soils encountered in the upper 3 to 8 feet across the site do not appear suitable for support of foundations and floor slabs. We recommend a general undercut of 3 feet across the building pad, followed by additional undercutting of up to 8 feet in the area of boring B-3. Other areas of deeper undercutting could exist between the borings.

After stripping of the site and performing the recommended undercutting, the exposed subgrade should be compacted and then proof-rolled under the observation of the Geotechnical Engineer as further discussed in the Earthwork section of this report. Any soft, loose, or otherwise unstable soils excessively deflecting during the proof-roll should be undercut and replaced with structural fill or stabilized as discussed in the Earthwork section of this report.

Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous or spread footing foundations after proper site preparations.

The onsite soils that are free of organics are considered suitable for re-use as structural fill. Moisture conditioning (i.e., drying) of the soft/loose should therefore be anticipated for onsite soils to be reused. Furthermore, soils failing the proofroll test may require additional reworking and drying to be stabilized in place, especially if earthwork is performed during the winter months. We recommend the grading contractor have a contingency in place to budget for import fill soils if the undercut soils contain organics and cannot be re-used as engineered fill.

Even after proper site preparation, the near surface soils could become unstable with typical earthwork and construction traffic, especially after precipitation events. The effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the Earthwork section.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the Exploration Results), engineering analyses, and our current understanding of the proposed project. The General Comments section provides an understanding of the report limitations.

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Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, subgrade stabilization, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Prior to grading operations, undercutting, and fill placement, the existing topsoil, and root mats should be removed. Complete stripping of the topsoil and other deleterious materials should be performed in the proposed building.

Any existing utilities present that will not serve the proposed development should be removed. Soft or loose soils are commonly encountered within existing utility trenches. If existing utilities are to be removed or rerouted from the site, all soft or loose soil should be removed, and the trenches should be properly backfilled with new structural fill.

After stripping the site and performing the recommended undercutting, but prior to fill placement, the exposed subgrade should be densified using a heavy vibratory roller having a maximum static weight of 12,000 lbs. and capable of exerting a minimum impact energy of 20,000 lbs.

After densification/compaction as described above, if possible, the subgrade should be proofrolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such areas should either be removed, further densified in place, or stabilized by other methods discussed in the following sections, depending on site and weather conditions. Excessively wet or dry material should either be removed or moisture conditioned and recompacted. If a proof roll is not feasible due to access constraints, the subgrade at the undercut elevation may be evaluated by probing under the observation of the geotechnical engineer. Compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction after undercutting are anticipated to be relatively workable if proper surface water and groundwater management is performed;



however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Soil Stabilization

While the subgrade after undercutting is generally anticipated to be stable after the initial exposure and compaction, unstable subgrades may develop in areas subjected to repetitive construction traffic or if earthwork is performed during the wetter and cooler periods of the year. Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, removal of unstable materials and replacement with granular fill. The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade after undercutting is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

Scarification and Recompaction - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed slopes.



Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as fill. Material property requirements for on-site soil for use as structural fill are noted in the table below We recommend the grading contractor have a contingency in place to budget for import fill soils if the undercut soils contain organics and cannot be re-used as engineered fill:

Property	Structural Fill
Composition	Free of deleterious material
Maximum particle size	4 inches
Fines content	Not limited
Plasticity	Liquid Limit less than 50 Plasticity index less than 30
GeoModel Layer Expected to be Suitable ^{1,2}	2, 3

- 1. Based on subsurface exploration.
- 2. Some moisture conditioning (i.e., drying) may be necessary

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Soil Type ¹ USCS	Acceptable Parameters (for Structural
Classification	Fill)
Low Plasticity	Liquid Limit less than 50
Cohesive	Plasticity index less than 30
Granular GW, GP, GC, SW, SP, SC	Less than 50% passing No. 200 sieve

 Structural fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site. Additional geotechnical consultation should be provided prior to use of uniformly graded gravel on the site.

Fill Placement and Compaction Requirements

Structural fill should meet the following compaction requirements.

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Item	Structural Fill
Maximum Lift	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used
Thickness	4 to 6 inches in loose thickness when hand-guided equipment
Minimum	(i.e. jumping jack of plate compactor) is used
Compaction Requirements ¹	98% of max.
Water Content	Low plasticity cohesive: -2% to $+2\%$ of optimum
Range ¹	Granular: -3% to +3% of optimum

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site low plasticity materials are considered suitable for backfill of utility and pipe trenches, provided the material is free of organic matter and deleterious substances. However, material used as trench backfill should comply with the pipe manufacturer or governing municipality's requirements.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs, footings, or pavements, the backfill should satisfy the gradation requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

All grades must provide effective drainage away from the building and paved areas during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than

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those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. In areas where hardscapes and/or paving do not abut against the structure, the roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of

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surficial materials (vegetation, topsoil, and undercutting of soft/loose soils), as well as proofrolling and mitigation of additional areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in Earthwork, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing	2,000 psf - foundations bearing upon new
Pressure ^{1, 2}	structural fill
Required Bearing Stratum ³	New structural fill
Minimum Foundation Dimensions	Per IBC 1809.7
Ultimate Passive Resistance ⁴	330 pcf (cohesive backfill)
(equivalent fluid pressures)	460 pcf (crushed stone)
	0.30 ultimate coefficient of friction –
Sliding Resistance ⁵	onsite soil or structural fill 0.35 ultimate coefficient of friction -
	granular material
Minimum Embedment below	18 inches

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Item

Finished Grade ⁶ Estimated Total Settlement from

Estimated Differential Settlement ^{2, 7}

Structural Loads²

- 1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
- 2. Values provided are for maximum loads noted in **Project Description**. Additional geotechnical consultation will be necessary if higher loads are anticipated.
- 3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in Earthwork.
- 4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure. Apply a factor of safety of at least 1.5 when designing for lateral force resistance.
- 5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations.
- Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
- 7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Design Parameters – Overturning and Uplift Loads

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils with consideration to the IBC basic load combinations.

Item	Description
Soil Effective Unit Weight ¹	60 pcf
Soil weight included in uplift resistance	Soil included within the prism extending up from the top perimeter of the footing at an angle of 20

1. Effective (or buoyant) unit weight should be used for soil above the foundation level and below a water level. The high groundwater level should be used in uplift design as applicable.

About 1/2 of total settlement

Less than about 1 inch

Description

degrees from vertical to ground surface
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Foundation Construction Considerations

As noted in Earthwork, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Sensitive soils exposed at the surface of footing excavations may require surficial compaction with hand-held dynamic compaction equipment prior to placing structural fill, steel, and/or concrete. Should surficial compaction not be adequate, construction of a working surface consisting of either crushed stone or a lean concrete mud mat may be required prior to the placement of reinforcing steel and construction of foundations.

If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the sketch below.



Overexcavation for structural fill placement below footings should be conducted as shown below. The overexcavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the **Earthwork** section.

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Floor Slabs

Design parameters for floor slabs assume the requirements for Earthwork have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters



- between the slab and foundation.
- 2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in Earthwork, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder,



the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no thirdparty beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly effect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

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Figures

Contents:

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Topsoil	Dark brown. Generally 6 to 7 inches, with a 3 foot thick section at Boring B-3.
2	Upper Soft Soils	Generally brown, soft native clays and very loose to loose native sands.
3	Residual Sands and Clays	Variable colors, includes stiff to hard clays (CL/CH) with variable sand and gravel content, and medium to very dense sands (SC/SM) with variable fines and gravel content.

LEGEND

Topsoil Sandy Lean Clay Clayey Sand

Clayey Sand with Gravel Silty Gravel with Sand Silty Sand Fat Clay

💋 Sandy Fat Clay

I First Water Observation

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

The groundwater levels shown are representative of the date and time of our

exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.



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Attachments

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Exploration and Testing Procedures



Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ± 10 feet) and referencing existing site features. If a more precise boring layout and elevations are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with an truck-mounted rotary drill rig using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. Groundwater was observed at depths of 16 feet and 5 feet in borings B-1 and B-3, respectively.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

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Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Atterberg Limits
- Percent Passing 200 Sieve

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

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Site Location and Exploration Plans

Contents:

Site Location Exploration Plan

Note: All attachments are one page unless noted above.

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Site Location



Geotechnical Engineering Report

Aggie Ave

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Exploration Plan



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DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

17

SITE PLAN PROVIDED BY LBYD

Suite

State Highwan

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Exploration and Laboratory Results

Contents:

Boring Logs (B-1 through B-6)

Note: All attachments are one page unless noted above.

Boring Log No. B-1

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	and the second second								
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3	M								
		12.0 475 SILTY SAND (SM), vellowish-brown, medium dense	-						
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Boring Log No. B-2

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Boring Log No. B-3



Model Layer	Graphic Log	Location: See Exploration Plan Depth (Ft.) Elevation.: 486 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines	
		TOPSOIL, dark-brown	-		X	0-0-1 N≈1				
2		CLAYEY SAND (SC), gray-brown, very loose	5-		X	0-0-0 N=0				
		8.0 478			X	0-4-4 N=8	18.6			
		<u>Entry Lent Sent (Set</u> , ordige gray blown, san, date there graver	- 10-		X	3-6-7 N=13				
		becomes orange-yellow at 12'				9.50/28				
3		14.0 472 SILTY GRAVEL WITH SAND (GM) , yellowish-brown, very dense, fine to coarse gravel	15-		X	8-50/2 N≃50+				
		17.0 469 FAT CLAY (CH), dark-gray, stiff								
		20.0 466 Boring Terminated at 20 Feet	20-		X	3-4-6 N=10				
See proc See Note	Explora edures Suppor	tion and Testing Procedures for a description of field and laboratory used and additional data (If any). Water Level O ting Information for explanation of symbols and abbreviations. Water obs Advancement Hollow stem aug Hollow stem aug	bservati erved at Method ger	ions 5' durin	g drill	ing		Drill Rig Mobile B-47 Driller Earth Core Logged by		
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400 Military St S | Hamilton, AL

Terracon Project No. E1235010

Boring Log No. B-4



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Model Lay	Graphic L		Depth (Ft.	Water Leve Observation	Sample Ty	Field Tes Results	Water Content (9	LL-PL-PI	Percent Fines
	11 1 1	Depth (Ft.) Elevation.: 486 (Ft.) TOPSOIL (7") (485 47							
		CLAYEY SAND (SC), brown, loose, trace gravel	-	4	ļ		-		
2	AND DE CONTRACTOR				\mathbb{N}	1-2-3			
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		3.0 483 CLAYEY SAND (SC), orange-red-brown, medium dense, trace chert		-					, , ,
		gravel	_		7	4.7.40			
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Boring Log No. B-5



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	- A	A CONTRACTOR	CLAYEY SAND (SC), orange-red-gray, medium dense, trace chert gravel	1 -			199 ₁₁₁₁			
	Page 1	and interest		-	1	X	4-8-8 N=16	18.0		
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Boring Log No. B-6

er	ő	Location: See Exploration Plan				a		()	Atterberg	
Model Lay	Graphic Lc			Depth (Ft.)	Water Leve. Observation:	Sample Typ	Field Test Results	Water Content (%	LL-PL-PI	Percent Fines
	11.3	Depth (Ft.) Elevation	.: 485 (Ft.)							
	1311	0.6 SANDY LEAN CLAY (CL), dark brown, soft	484.42							
		A CONTRACT CONTRACT OF A CONTRACT.				$\overline{)}$				
2				-		Х	1-2-2 N=4			
		3.0	482			/ Ν				
	A Strate of the second	CLAYEY SAND (SC), orange-brown-gray, loose to medium dense, trace chert gravel		—						
	and a start of the					V	3-4-6	17.9		
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	AND	8.0	477			<u>/</u> }				
3		SANDY LEAN CLAY (CL), orange-brown-gray, stiff, trace chert grav	vel							
11888				_		\bigvee	4-5-7	16.0		
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566	Suppor	ung information for explanation of symbols and abbreviations.								
Note	25		vancament 1	lathod			n ing paganéné Manangka dan Ag Antari Santari Santari		Driller Earth Core	
Hollow stem auger								Logged by		
									Boring Starter	đ
Abandonment Method Boring backfilled with auger cuttings upon completion.									U3-14-2023 Boring Comple	eted
									03-14-2023	

Supporting Information

Contents:

General Notes Unified Soil Classification System

Note: All attachments are one page unless noted above.

.



General Notes

Sampling		Wa	ter Level		Field Tests
⊼ Standard		Water Initially Encountered		N	Standard Penetration Test Resistance (Blows/Ft.)
Penetration Test		Water Level After Specified Period	er a of Time	(HP)	Hand Penetrometer
		Water Level After a Specified Perio	er od of Time	(T)	Torvane
		Cave In Encountered		(DCP)	Dynamic Cone Penetrometer
	W Je	ater levels indicated on vels measured in the bo	the soil boring logs are the rehole at the times indicated.	UC	Unconfined Compressive Strength
	G Io	roundwater level variation w permeability soils, acc	ons will occur over time. In curate determination of	(PID)	Photo-Ionization Detector
	gı w	oundwater levels is not ater level observations.	possible with short term	(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

		Strength Terms	5						
Relative Densi	ty of Coarse-Grained Soils		Consistency of Fine-Grained Se	oils					
(More than 50% Density determined b	 retained on No. 200 sieve.) y Standard Penetration Resistar 	nce Consistency dete	(50% or more passing the No. 200 sleve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance						
Relative Density	Standard Penetration N-Value (Blows/Ft.)) or Consistency	Unconfined Compressive Strength Qu (tsr)	Standard Penetration or N-Value (Biows/Ft.)					
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1					
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4					
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8					
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15					
Very Dense		Very Stiff	2.00 to 4.00	15 - 30					
		Hard	> 4.00	> 30					

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using

	Labora	atory Tests ^A		Group Symbol	Group Name ^B
	Crowalas	Clean Gravels:	Cu≥4 and 1≤Cc≤3 [€]	GW	Well-graded gravel F
	More than 50% of	Less than 5% fines ^c	Cu<4 and/or [Cc<1 or Cc>3.0] ^E	GP	Poorly graded gravel F
	coarse fraction retained on No. 4	Gravels with Fines:	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
Coarse-Grained Soils:	sieve	More than 12% fines ^c	Fines classify as CL or CH	GC	Clayey gravel F, G, H
on No. 200 sieve		Clean Sands:	Cu≥6 and 1≤Cc≤3 [€]	SW	Well-graded sand ¹
	50% or more of	Less than 5% fines ^D	Cu<6 and/or [Cc<1 or Cc>3.0] [£]	SP	Poorly graded sand ¹
	coarse fraction	Sands with Fines:	Fines classify as ML or MH	SM	Silty sand G, H, I
	pubble not reter	More than 12% fines $^{\rm D}$	Fines classify as CL or CH	SC	Clayey sand G, H, I
	ing a line theorem. An	\ \ \ _	PI > 7 and plots above "A" line 3	CL	Lean clay K, L, M
	Silts and Clays:	Inorganic:	PI < 4 or plots below "A" line ³	ML	Silt K, L, M
Fine-Grained Soils:	50	Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N} Organic silt ^{K, L, M, O}
No. 200 sieve			PI plots on or above "A" line	СН	Fat clay K, L, M
	Silts and Clays:	inorganic:	PI plots below "A" line	MH	Elastic silt K, L, M
	more	Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	он	Organic clay ^{K, L, M, P} Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily of	PT	Peat		

- ^A Based on the material passing the 3-inch (75-mm) sieve. ^B If field sample contained cobbles or boulders, or both, add "with
- cobbles or boulders, or both" to group name. ^c Gravels with 5 to 12% fines require dual symbols: GW-GM well-
- graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay. ^D Sands with 5 to 12% fines require dual symbols: SW-SM well-
- graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
- $E Cu = D_{60}/D_{10}$ Cc = $(D_{30})^2$
 - D₁₀ × D₆₀
- ^F If soll contains \geq 15% sand, add "with sand" to group name.
- ^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

- - * If fines are organic, add "with organic fines" to group name.
 - ^I If soil contains ≥ 15% gravel, add "with gravel" to group name.
 - ³ If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay. K If soil contains 15 to 29% plus No. 200, add "with sand" or

erracor

Soil Classification

- "with gravel," whichever is predominant.
- ^L If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
- ^M If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
- ^N PI ≥ 4 and plots on or above "A" line.
- ° PI < 4 or plots below "A" line.
- P PI plots on or above "A" line.
- 9 PI plots below "A" line.



1.0 <u>Requirements</u>

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 <u>Completion Date</u>

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 <u>Time For Completion</u> 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 <u>Product Approval</u>

- 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 <u>Weather Protection</u>

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 <u>Coordination Between Trades: Contractor's Pre-Construction Coordination Meeting</u>
 A. Plumbing, Heating, Ventilating, Air Conditioning and Electrical Drawings are diagrammatic.
 - B. BEFORE COMMENCING WORK UNDER THIS CONTRACT, GENERAL CONTRACTOR

Job No. 22-131

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 <u>City Ordinances</u>
 - 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 <u>three (3)</u> copies of a brochure containing manufacturer's operating, lubricating and maintenance instructions and parts lists for <u>each</u> <u>item of equipment furnished under this contract</u>. 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. <u>Protect and cause no damage to adjacent area and site</u>. 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

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 <u>Dimensions</u>

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 <u>Fire Protection</u>

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
PROJECT COORDINATION - SECTION 01040

1.0 - GENERAL REQUIREMENTS

1.1 <u>Related Documents</u>

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. <u>General</u>

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. <u>Coordination Drawings</u>

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. <u>Bi-Weekly Coordination Meetings</u>

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 preinstallation 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. <u>General</u>

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. <u>General</u>

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. <u>Survey Procedures</u>

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

<u>General</u>

Α.

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. <u>General</u>

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. <u>Reporting Unusual Events</u>

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

Α.

- 3.1 General Installation Provisions
 - 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.

- 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.
- 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.

1.0 GENERAL REQUIREMENTS

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

- 1.1 <u>Temporary Structures (Optional)</u>
 - A. Provide and maintain field office separate from the project of not more than 300 sq. ft. in area.
 - B. The entire facility, including furniture, will remain the property of the Contractor and shall be removed from the site by completion of the Work.
 - C. Portable office or trailer shall meet all appropriate regulation and 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 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 <u>Protection</u> Conform to requirements of "Safety & Protection of Persons and Property", in GENERAL CONDITIONS.
- 1.7 <u>Maintaining Traffic</u>
 - 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 <u>Maintenance and Removal</u> 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.

1.0 - GENERAL REQUIREMENTS

1.1 <u>Related Documents</u>

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. <u>General</u>

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. <u>Definitions</u>

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.
- 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 <u>Responsibilities</u>

A. <u>Testing</u>

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

B. <u>Re-Test Responsibilities</u>

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. Retesting 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.
- Delivery of samples to test laboratories.
- 4. Security and protection of samples and test equipment at the project site.

D. <u>Coordination</u>

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 <u>Submittals</u> A. Ge

<u>General</u>

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. <u>Report Data</u>

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.
- Dates and locations of samples and tests or inspections.
- 3. Names of individuals making the inspection or test.
- Designation of the work and test method.
- 5. Complete inspection or test data.
- 6. Test results.
- 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.

1.0 - GENERAL

- A. Summary: Shop drawings may be transmitted for approval by electronic format or by hard copies.
 - 1. Digital Copies:
 - Shop drawing and product data submittals shall be transmitted to Architect's office in electronic (PDF) format via email at <u>submittals@lathanassociates.com</u>. 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. <u>Submittal Procedures:</u>

- 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. <u>Processing</u>: 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. <u>Submittal Preparation:</u> 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.
- <u>Transmittal Letter:</u> 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 <u>Approved</u> or <u>Approved as Noted</u>.

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

- C. <u>Submittal Schedule:</u>
 - 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. <u>Product Data:</u>
 - 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. <u>Submittals:</u>
 - a. Unless noncompliance with Contract Documents is observed, the submittal serves as the final submittal.
 - 4. <u>Distribution</u>:
 - 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. <u>Samples:</u>
 - 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. <u>Architect's Action:</u>
 - 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. <u>Action Stamp</u>

	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 app	licable.		

<u>3.0 - EXECUTION</u> Not applicable.

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

1. <u>Processing</u>: 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. <u>Submittal Preparation:</u>

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.
- e. 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: <u>submittals@lathanassociates.com</u>

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.

General Contractor

by:___

Authorized Signature

Architect Job Name and Number

PRODUCT SUBSTITUTION PROCEDURES - SECTION 01360

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:
 - 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:
 - 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;
- 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
 - 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.
 - Should substitution be accepted, and substitution subsequently is defective or

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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.

PRIOR APPROVAL / SUBSTITUTION REQUEST FORM

Da	ate:						
Company Submitting Request: _		(Name and Address)					
Co	ontact Name:		Phone:	Fax:			
E-	Mail:						
PF							
SF	PECIFIED ITEM:						
	(Section)	(Page)	(Descri	ption)			
Th	e undersigned requests conside	ration of the followin	g product substi	tution:			
PF							
	Ph	ovide Product Name / Mo	del /Manufacturer				
1.	Attached data includes:	 Product Description Drawings 	on Pe Sp	rformance and Test Data ecifications Photographs			
2.	Yes / No changes w product substitution. If yes, the	vill be required to the in attach data that inc	Contract Docun cludes descriptio	nents for the proper installation of proposed on of changes.			
<u>Th</u>	e undersigned states that the	following paragrap	<u>hs, unless moc</u>	lified 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 warranty requirements.	have no adverse effe	ect on other trad	es, the construction schedule, or specified			
4.	No maintenance is required by the proposed substitution other than that required for originally specified product.						
5. Th ma or Sig	Other Information the undersigned further states t anual and confirms that the fur superior to the originally spec gnature:	hat they have read action, appearance sified product	the correspond and quality of t initial. Printed Name	ding specification section in the project the proposed substitution are equivalent			
			Eav Number:				
F -	- Architectic II.co.		Tax Number.				
ro	Accounted	Accortad Ac Natad		Incomplete Information			
	Accepted	Received Too Late		No Substitutions Accented For This			
		Noceived 100 Late		Product			
Re D	eviewed By / Date:						
rr Co	ocessed by Addendum No						
CC	/////ents						

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 <u>Trade Names</u>

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 <u>Salvageable Material</u>

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.

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SECTION 01410 - QA/QC, STRUCTURAL TESTS, & 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.
- E. 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.
- F. 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.
- G. 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.
- H. 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.
 - 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.
 - 1. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
 - 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.
 - 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:
 - 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.
 - 2. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
 - 3. 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.
 - a. 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.
 - a. 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:
 - a. 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.
 - b. When frequency of testing will provide fewer than five compressivestrength 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.
 - 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.
 - a. 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.
 - a. 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.
 - a. Verify correct mix is used.
- E. Concrete, Periodic Inspection
 - 1. Floor flatness:
 - a. 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.
 - 5. Inspect the installation of anchors installed in hardened concrete.
- F. Masonry, Continuous Inspection
 - 1. Inspect grouting operations to ensure compliance with code and construction documents.
 - 2. Inspect masonry cells and cleanouts prior to placement of grout. Inspect placement of all grout.
 - 3. Inspect type size and location of anchors, including details of anchorage of masonry to structural members, frames or other construction.

- 4. Inspect preparation of grout specimens, mortar specimens and / or prisms.
- G. Masonry, Periodic Inspection
 - 1. At beginning of masonry construction:
 - a. Inspect proportions of site prepared mortar and grout.
 - b. Inspect construction of mortar joints.
 - c. Inspect reinforcement for correct size and spacing.
 - 2. At beginning of masonry construction and every 1000 square feet of masonry thereafter
 - a. Inspect work for size and location of structural elements
 - b. Inspect work for correct location and type of embeds and anchor bolts.
 - c. Specified size, grade, and type of reinforcement.
 - 3. Prior to grouting
 - a. Inspect masonry cells and cleanouts prior to placement of grout. Verify spaces are clear.
 - b. Inspect any site prepared grout proportions.
 - c. Inspect placement of reinforcement.
 - d. Inspect construction of mortar joints
 - 4. Inspect protection of masonry during cold weather and hot weather.
 - a. 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.
- H. Steel Construction, Continuous Inspection
 - 1. Inspect welding: Structural Steel:
 - a. Complete and partial penetration groove
 - 1. Perform Continuous Inspection during the Welding Operations to verify compliance with approved WPS.
- I. Steel Construction, Periodic Inspection
 - 1. Inspect high-strength bolts, nuts and washers:

- a. Identify markings to conform to ASTM standards specified in the construction document.
- b. Inspect manufacturer's certificate of compliance.
- 2. Inspect high-strength bolting: Bearing-type connections.
- 3. Inspect and verify structural steel material:
 - a. Identification markings to conform to ASTM standards specified in the approved construction documents.
 - b. Manufacturers' certified mill test reports.
- 4. Inspect and verify weld filler materials:
 - a. Identification markings to conform to AWS specification in the approved construction documents.
 - b. Manufacturer's certificate of compliance required
- 5. Inspect welding: Structural Steel:
 - a. Single-pass fillet welds $\leq 5/16$
 - b. Floor and deck welds.
- J. Cold Formed Metal Trusses, Periodic Inspection
 - 1. Inspect metal roof trusses and shop built components.
 - a. 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.
 - a. Inspect all site-built trusses. Inspect erected trusses and installation of bridging.
 - b. Site-built trusses shall be periodically inspected for member size, type, and gage.
 - c. Site-built trusses shall be continuously inspected (each truss) for connection including number and size of screws and spacing and fit up of joints.
 - 3. Inspect connection of truss elements including number of screws and attachment of connections of individual truss components.

- 4. Inspect trusses for damage.
- 5. Trusses shall be reviewed for fit-up in structure.
- 6. Inspect truss to truss connections and truss to structure connections.
- 7. Inspect high-load diaphragms.
 - a. Inspect all diaphragms after installation is complete.
- 8. Inspect restraint/bracing.
 - a. Inspect all bridging and bracing installation.
 - b. 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.
- K. Inspect Hollow Core Panels
 - 1. Inspect panel placement.
 - 2. Inspect panel connection to structure.
- L. Special Inspection for Wind Resistance, Periodic Inspection
 - 1. Roof Cladding and Roof Framing Connections.
 - 2. Wall Connections to Roof.
 - 3. Diaphragms connections to framing.
- M. 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 – FORMS AND SCHEDULES (ATTACHED)
Statement of Special Inspections

New Gymnasium for: Hamilton Middle School Project:

Location: Hamilton, Alabama

Owner: Marion County Board of Education

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 Architectural

Mechanical/Electrical/Plumbing 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)		~	
(type of plant name)			
Sianatura		Data	
Signature		Dale	Design Professional Seal
Owner's Authorization:		Building Official's Acce	eptance:
Signature	Date	Signature	Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

\Box	Soils and Foundations		Spray Fire Resistant Material
	Cast-In-Place Concrete		Wood Construction
	Precast Concrete		Exterior Insulation and Finish System
	Masonry		Mechanical & Electrical Systems
\Box	Structural Steel		Architectural Systems
\square	Cold-Formed Steel Framing	\square	Special Cases

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspection Coordinator		
2. Inspector		
3. Inspector		
4. Testing Agency		
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Final Report of Special Inspections

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

Contractor's Statement of Responsibility

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

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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Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
1.00	Fabricators			
1.01	Review the quality control procedures of the following fabricators for completeness and adequacy relative to the fabricator's scope of work: steel fabricator, CFS truss fabricator, wood truss fabricator, hollow core slab plank maufacturer.	Periodic		ΟΤΑ
1.02	The following fabricators, if registered and approved by the building official, may submit	Periodic		ΟΤΑ
	"Certificates of Compliance" at the completion of their scope of work that their fabricated items were constructed in accordance with the approved construction documents: steel fabricator, CFS truss fabricator, wood truss fabricator, hollow core slab plank maufacturer.			
2.00	Soils and Deep Foundations			
2.01	Verify bearing capacities of soils beneath footings.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	ΟΤΑ
2.02	Verify assumed bearing capacities and determine settlements of soils beneath footings and building pad.	Periodic	As noted on the drawings, recommended by the geotechnical engineer, and specified in earthwork specifications.	ΟΤΑ
2.03	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.	Periodic	As recommended in approved soils report and specified in earthwork specifications.	ΟΤΑ
3.00	Concrete Construction			
3.01	Spread footings are excepted from the			ΟΤΑ
3.02	Continuous footings are excepted from the inspections listed below.			ΟΤΑ
3.03	Slabs on grade are excepted from the inspections listed below.			ΟΤΑ

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
3.04	Inspect reinforcing steel except as noted above 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	Periodic	Prior to each pour.	OTA; SDG & OTA for Storm Shelter
3.05	Inspect weldability of reinforcing steel other than ASTM A706.	Periodic	Prior to fabrication.	ΟΤΑ
3.06	Inspect welded shear reinforcement.	Continuous	During installation.	ΟΤΑ
3.07	Inspect all other welded reinforcement.	Periodic	Prior to pour.	ΟΤΑ
3.08	Inspect bolts	Periodic		ΟΤΑ
3.09	Inspect bolts to be installed in concrete prior to and during placement of concrete.	Continuous	During placement and concreting operations.	ΟΤΑ
3.10	Verify each proposed concrete mix for the	Periodic	For each proposed mix.	ΟΤΑ
3.11	Sample all concrete for strength tests and test concrete for slump, air content, temperature, and other tests.	Continuous	During placement operations. Reference concrete specifications for specific tests and frequencies.	ΟΤΑ
3.12	Inspect concrete placement except as noted	Continuous		ΟΤΑ
3.13	Inspect all concrete curing operations as noted in the extents column.	Periodic	Monitor during hot, cold and windy conditions. Reference concrete specifications.	ΟΤΑ
3.14	Erection of precast concrete members.	Periodic	Inspect all connections.	ΟΤΑ
3.15	Verification of in-situ concrete strength prior to removal of forms and shores supporting weight of concrete.	Periodic	Prior to form or shoring removal.	ΟΤΑ
3.16	Verification of in-situ concrete strength prior to backfilling walls.	Periodic	Prior to backfilling operations.	ΟΤΑ
3.17	Inspect Post installed anchors, expansion	Periodic		OTA
3.18	Inspect Post installed anchors, epoxy anchors	Continuous		OTA

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
4.00	Masonry Construction			
4.01	Masonry foundation walls are excluded from inspections listed below.			ΟΤΑ
4.02	Inspect proportions of site prepared mortar and grout. Inspect construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct location and type of embeds and anchor bolts. Inspect work for size and location of structural elements.	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	OTA
4.03	Inspect masonry cells and cleanouts prior to placement of grout. Inspect grout proportions. Inspect placement of reinforcement.	Periodic	Prior to grouting of masonry.	ΟΤΑ
4.04	Inspect grouting operations to ensure compliance with code and construction documents.	Continuous	During grouting.	ΟΤΑ
4.05	Inspect proportions of site prepared mortar and grout. Inspect placement of masonry units and construction of mortar joints. Inspect reinforcement for correct size and spacing. Inspect work for correct size and location of	Periodic	At beginning of masonry construction and every 1000 square feet of masonry thereafter.	ΟΤΑ
4.06	Inspect masonry cells and cleanouts prior to placement of grout. Inspect placement of all grout.	Continuous	During grouting.	ΟΤΑ
4.07	Inspect type size and location of anchors, including details of anchorage of masonry to structural members, frames or other construction.	Continuous	During installation of anchors.	ΟΤΑ
4.08	Inspect welding of reinforcing bars.	Continuous	During installation and welding of all reinforcing.	ΟΤΑ
4.09	Inspect protection of masonry during cold weather and hot weather.	Periodic	During periods with temperatures below 40 degrees or above 90 degrees.	ΟΤΑ
4.10	Inspect preparation of grout specimens, mortar specimens and / or prisms.	Continuous	During preparation of all specimens.	ΟΤΑ
4.11	Verify compliance with all required inspection provisions of the construction documents and approved submittals.	Periodic	As required for duration of project.	ΟΤΑ

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
5.00	Steel Construction			
5.01	Inspect high-strength bolts, nuts and washers: a. Identify markings to conform to ASTM standards specified in the construction documents. b. Inspect manufacturer's certificate of compliance.	Periodic	Reference project specifications and ASTM material specifications; AISC 335, (Sect A3.4); AISC LRFD (Sect A3.3).	ΟΤΑ
5.02	Inspect high-strength bolting: Bearing-type connections.	Periodic		ΟΤΑ
5.03	Inspect high-strength bolting: Slip-critical connections.	Periodic or Continuous	Continuous monitoring required for pretensioning using calibrated wrench method or turn-of-nut method without matchmarking.	ΟΤΑ
5.04	Inspect and verify structural steel material: a. Identification markings to conform to ASTM standards specified in the approved construction documents. b. Manufacturers' certified mill test reports	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	ΟΤΑ
5.05	Inspect and verify weld filler materials: a. Identification markings to conform to AWS specification in the approved construction documents. b. Manufacturer's certificate of compliance required	Periodic	Confirm that materials meet applicable ASTM specifications noted in construction documents.	ΟΤΑ
5.06	Inspect welding: Structural Steel: 1) Complete and partial penetration groove 2) Multipass fillet welds. 3) Single-pass fillet welds > 5/16 "	Continuous	Per specifications and AWS D1.1	ΟΤΑ
5.07	 Inspect welding: Structural Steel: 1) Single-pass fillet welds ≤ 5/16 " 2) Floor and deck welds. 	Periodic	Per specifications and AWS D1.1	ΟΤΑ
5.08	Inspect steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.	Periodic	Inspect complete frame.	ΟΤΑ
5.09	Inspect and verify steel deck attachment.	Periodic		OTA
6.00	Special Inspections for Wind Resistance			
6.01	Roof Cladding and Roof Framing Connections	Periodic		ΟΤΑ

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
6.02	Wall Connections to Roof and Floor Diaphragms and Framing	Periodic		ΟΤΑ
6.03	Roof and Floor Diaphragm Systems, including Collectors, Drag Struts, and Boundary Elements.	Periodic		ΟΤΑ
6.04	Vertical Windforce-Resisting Systems, including Braced Frames, Moment Frames, and Shearwalls	Periodic		ΟΤΑ
6.05	Windforce-Resisting System Connections to the Foundation.	Periodic		ΟΤΑ
6.06	Fabrication and installation of components and assemblies required to meet the impact-resistance requirements of Section 1609.1.4.	Periodic		ΟΤΑ
7.00	Special Inspections for Seismic Resistance			
7.01	Inspect structural welding in accordance with AISC 341.	Continuous	Exceptions: 1. Single-pass fillet welds not exceeding 5/16 inch in size.	ΟΤΑ
7.02	Inspect nailing, bolting, anchoring and other fastening of components within the seismic- force-resisting system including drag-struts,	Periodic		ΟΤΑ
7.03	Inspect welding operations of cold-formed steel framing elements of the seismic-force-resisting system	Periodic		ΟΤΑ
7.04	Inspect screw attachment, bolting, anchoring and other fastening of cold-formed steel framing components within the seismic-force-resisting system.	Periodic		ΟΤΑ
7.05	Certificates of compliance used in masonry		Prior to construction.	OTA
7.06	Verify masonry fm.		Prior to construction.	ΟΤΑ
7.07	Test masonry f ^r m.	Periodic	Test for each 5000 sf of	ΟΤΑ
7.08	Verification of proportions of materials in mortar and grout as delivered to the site	Periodic	masonry.	ΟΤΑ
7.09	Review certified mill test reports of all concrete reinforcing.			ΟΤΑ

Item	Inspection / Test / Certification	C or P	Extent / Comments	Agent
7.10	Submit certificate of compliance for designated			ΟΤΑ
	seismic system components			
10.00	Cold Formed Steel Framing Construction			ΟΤΑ
10.01	Inspect exterior wall infill including installed	Periodic		OTA
	studs' sizes and attachments.			
10.02	Inspect roof trusses assembly/framing and	Periodic		OTA
	attachments.			
10.03	Verify size and gage of load bearing studs.	Periodic		OTA
10.04	Verify load bearing framing spacing,	Periodic		OTA
	configuration and attachments.			
10.05	Verify load bearing bracing and blocking	Periodic		OTA
10.06	Proper seating of studs in track.	Periodic		OTA
10.07	Stud header size, gauge, and construction per	Periodic		OTA
	structural drawings for load bearing walls.			
10.08	Screw attachments, bolting, anchoring, and	Periodic		ΟΤΑ
	other fastening of components per structural			
	drawings.			
10.09	Welding of elements per structural drawings.	Periodic		ΟΤΑ
10.10	Where a cold-formed steel truss clear span is 60	Periodic		ΟΤΑ
1	feet or greater, verify that the temporary			
l	installation restraint/bracing and the permanent			
	individual truss member restraint/bracing are			
	installed in accordance with the approved truss			
	submittal package.			
INSPEC	TION AGENTS			
#	Firm, Address, Telephone			
OTA	Owner's Testing Agent			
SDG	SDG 300 Chase Park South, Suite 125,	Hoover, AL	_ 35244 (205) 824 - 52	00
			·····	
	······································			
[
Note: Th	e inspection and testing agent(s) shall be engaged b	y the Owner	r or the Owner's Agent, and	not by
the Cont	ractor or Subcontractor whose work is to be inspect	ed or tested	Any conflict of interest mus	t be
disclosed	d to the Building Official prior to commencing work.	The qualifi	cations of the Inspection Age	ent(s)
may be s	ubject to the approval of the Building Official.			

Is the Schedule of Special Inspection Services part of a Quality Assurance Plan as defined in Sections 1705 or 1706 of the Building Code?

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

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.
 - 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.

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

CHANGE ORDER PROCEDURES - SECTION 01800

<u> 1.0 - GENERAL</u>

- 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.
 - 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. <u>Overhead "Indirect Costs"</u>: 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 <u>https://dcm.alabama.gov/forms_publicK12.aspx</u>. 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 <u>Officer</u> 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.
 - 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

WARRANTIES - SECTION 01900

1.0 - GENERAL

- A. <u>Standard product warranties</u> are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. <u>Special warranties</u> 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.
 - Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
- C. <u>Warranties</u>
 - 1. <u>Subcontractors:</u> General Contractor shall provide a one-year warranty from each Subcontractor they have under contract for the project.
 - 2. <u>Vendors/Suppliers:</u> 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. <u>Manufacturers:</u> 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. <u>Roof Warranties</u>: The executed roofing warranties shall be presented at Final Inspection. Manufacturer's warranties cannot be prorated.
- D. <u>Disclaimers and Limitations</u>: 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. <u>Related Damages and Losses</u>: 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. <u>Reinstatement of Warranty</u>: 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. <u>Replacement Cost</u>: 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. <u>Owner's Recourse</u>: 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.
 - 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 Protection Site Clearing Soil Poisoning Earthwork Water Distribution Sanitary Sewerage Site Concrete Walks, Curbs & Paving

DIVISION 3 - CONCRETE Cast-in-Place Concrete

DIVISION 4 - MASONRY Unit Masonry

DIVISION 5 -METALS Structural Steel Steel Roof Deck Cold-Formed Metal Framing Miscellaneous Metals

DIVISION 6 - CARPENTRY Rough Carpentry

DIVISION 7 - MOISTURE PROTECTION Wall Flashing Firestop Caulking and Sealing

DIVISION 8 - WINDOWS AND DOORS Hollow Metal Doors and Frames Flush Wood Doors Fiberglass (FRP) Doors and Frames Coiling Counter Doors Aluminum-Framed Entrances and Storefronts Finish Hardware Glass and Glazing

DIVISION 9 - FINISHES Gypsum Drywall & Light Gauge Metal Stud System Acoustical Panel Ceilings

Job No. 22-131

Modular Athletic Flooring Resilient Tile Flooring Resilient Rubber Base and Accessories Epoxy Resinous Flake Flooring Acoustical Panel Treatment Paint

DIVISION 10 - SPECIALTIES Exterior Building Letters Identifying Devices Roof Identification Plaque Protective Cover-Walkway Toilet Accessories

DIVISION 11 - EQUIPMENT Gymnasium Equipment Indoor Gymnasium Scoreboards

DIVISION 12 - FURNITURE AND FIXTURES Fire Extinguishers Miscellaneous Furnishings and Fixtures Laminate Clad Casework Telescoping Gym Seats Specifications

DIVISION 15 - MECHANICAL – HVAC Mechanical Systems – Equipment – Labor

DIVISION 15 – PLUMBING and FIRE PROTECTION Plumbing Systems – Fixtures - 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:	<u></u>
GENERAL CONTRACTOR:	
PROJECT OWNER:	
ARCHITECT: Lathan Associates	Architects, P.C., 300 Chase Park South, Suite 200, Hoover, AL 35244
PROJECT SUBSTANTIAL COM	PLETION DATE:
This is to certify that we, above referenced project, per cor performed for a period of One (1)	, the General Contractor for the ntract documents, warrant all labor, material and equipment provided and Year from the Date of Substantial Completion indicated above.
If applicable, we warrant addition	al work, materials and equipment for One (1) Year on the following:
Ву:	
(Name and Title)	
Dated this o	day of
State of Alabama County of	
Sworn to and subscribed before	me this
day of	
Notary Public	
My Commission Expires:	

Job No. 22-131

SUBCONTRACTOR WARRANTY FORM

G. C.' S PROJECT NO ARCHITECT'S PROJECT NO:	·····
PROJECT NAME:	<u> </u>
GENERAL CONTRACTOR:	
SUBCONTRACTOR:	
(Name and Address)	nama da na anala da Malina Alama Na Kura a sa
PROJECT OWNER:	
ARCHITECT: Lathan Associates Architects, P.C., 300 Chase Park South, S	<u>uite 200, Hoover, AL 35244</u>
PROJECT SUBSTANTIAL COMPLETION DATE:	
We,, Subcontractor for	
(name) (work) do hereby warrant that all
labor and materials provided and performed in conjunction with above referen	ced project are in accordance
with the Contract Documents and will be free from defects due to defective ma	aterials 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 materia	als and/or workmanship, the
same, including adjacent work displaced, shall be made good by the undersig	ned at no expense to the
Owner.	
The Owner will give Subcontractor written notice of defective work. Should Subcontractor written notice of defective work.	ubcontractor fail to correct
and charge Subcontractor cost for such correction. Subcontractor agrees to r	bay such charges upon
demand.	, , ,
Momenty applies to the following Mark:	
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. <u>Final Inspection Procedures</u>: 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. <u>Record Drawings:</u> 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. <u>Record Specifications:</u> 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. <u>Maintenance Manuals</u>: 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. <u>Close-Out Documents</u>

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. <u>Final Cleaning</u>: 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. <u>Pest Control</u>: Engage a licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.
- E. <u>Removal of Protection</u>: Remove temporary protection and facilities.
- F. <u>Compliance</u>: 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.
 - 3. 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.
 - Prevent and control soil erosion and gulleying within the property covered by Contract and the lands immediately adjacent thereto as a result of construction.
 - 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.
 - 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.
 - 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 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. State and local codes shall control the disposal of trees, shrubs and other matter from the site clearing and grubbing operations.
- C. The contractor shall notify the local agencies prior to beginning work, obtain all required permits, and shall be responsible for complying with their requirements.

1.2 <u>SUMMARY</u>

- A. This Section includes the following:
 - 1. Protecting existing trees and vegetation to remain.
 - 2. Removing trees and other vegetation.
 - 3. Clearing and grubbing (to include deep root systems).
 - 4. Topsoil stripping.
 - 5. Removing above-grade site improvements.
 - 6. Removing below grade improvements.
 - 7. Disconnecting, capping or sealing, and abandoning site utilities in place.
 - 8. Disconnecting, capping or sealing, and removing site utilities.
- B. Related Sections include the following:
 - 1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
 - 2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
 - 3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 <u>DEFINITIONS</u>

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 <u>SUBMITTALS</u>

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

- B. Record drawings according to Division 1 Section "Contract Closeout."
 - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 **PROJECT CONDITIONS**

- A. It shall be the contractor's responsibility to inspect the site to determine any discrepancies which would affect his work and to make allowable for such discrepancies in the contract sum and to notify the architect in writing of such discrepancies.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.
- D. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- E. Notify utility locator service for area where Project is located before site clearing.

2<u>.0 - PRODUCTS</u>

2.1 SOIL MATERIALS

A. Suitable Soil Materials: Requirements for suitable soil materials are specified in Division 2 Section 02300 "Earthwork."

3.0 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soilbearing water runoff or airborne dust to adjacent properties and walkways.
- C. Locate and clearly flag trees and vegetation to remain.
- D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 <u>UTILITIES</u>

- 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. Excavate for and remove underground utilities indicated to be removed.

3.3 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade or as required by Owner's on-site Geotechnical Engineer.
 - 4. Use only hand methods for grubbing within drip line of remaining trees.
- B. Fill depressions caused by clearing and grubbing operations with suitable soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in accordance with Section 2300 Earthwork, to make the surface conform to the surrounding original ground surface.
- C. Remove existing boulders above cut slope areas as needed to prevent toppling.

3.4 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Maximum slope of topsoil pile 3H:1V
 - 2. Do not stockpile topsoil within drip line of remaining trees.
 - 3. Dispose of excess topsoil as specified for waste material disposal.

- 4. Stockpile surplus topsoil and allow for re-spreading deeper topsoil.
- 5. Existing topsoil to not be used within the limits of the track. Off-site topsoil shall be used with the select soil blend.

3.5 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing, full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.6 <u>DISPOSAL</u>

A. Disposal: Remove surplus soil material, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230
<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

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 <u>Applicator</u>

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 <u>Guarantee</u>

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 <u>Chemicals</u>

BASF - Termidor (Fipronil) Taurus SC - Control Solutions (Fipronil) Bayer Environmental Science - Premise

2.2 <u>Mixing of Chemicals</u> Shall be observed on site by the Contractor's Superintendent.

3.0 - EXECUTION

3.1 <u>Application</u> A. <u>Slab-On Ground Construction (Minimum application)</u>

- 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 Terracon Consultants, Inc., dated March 28, 2023.
 Project Number: E1235010. 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. Remove any excess topsoil from the site upon final stabilization.
 - 3. Scarifying, moisture conditioning, 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.
 - Remove materials from grading operations that are determined unsuitable by the Geotechnical Engineer from site and dispose of offsite.
 - 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 <u>UNIT PRICES</u>

- 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: 2,400 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 as-built survey measurement process for unsuitable soil amounts shall be the 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. Structural Fill: Systematically compacted 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.
 - 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 <u>SUBMITTALS</u>

- 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. 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.

1.8 **REFERENCE STANDARDS**

- A. Follow most current publications from part of this specification to the extent indicated by references thereto.
- B. American Association of State Highway and Transportation Officials Standard Specifications (AASHTO).
- C. American Society for Testing and Material (ASTM):

1. D 422	Method for Particle Size Analysis of Soil.
2. D 698	Tests for Moisture-Density Relations of Soils, Using 5.5 lb.
	Rammer and 12-inch Drop (Standard Proctor)
3. D 1556	Test for Density of Soil in Place by the Sand Cone Method.
4. D 1557	Test for Moisture-Density Relations of Soils Using 10-lb.
	Rammer and 18-inch Drop (Modified Proctor)
5. D 1559	Test Method for Resistance to Plastic Flow of Bituminous
	Mixtures using Marshall Apparatus.
6. D 2167	Test for Density of Soil in Place by the Rubber Balloon Method.
7. D 2216	Laboratory Determination of Moisture Content of Soil.
8. D 2487	Classification for Soils for Engineering Purpose.
9. D 2922	Test for Density of Soil and Soil-Aggregate in Place by Nuclear
	Methods (Shallow Depth).
10. D 3017	Test for Moisture Content of Soil and Soil-Aggregate in Place by
	Nuclear Methods (Shallow Depth).

- 11. D 4318 Test Plastic Limit, Liquid Limit and Plasticity Index of Soils.
- 12. C 25 Chemical Analysis of Limestone, Quickline and Hydrated Lime.
- 13. C 110 Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method.
- 14. C 618 Specification for Fly Ash and Raw of Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- 15. C 977 Quicklime and Hydrated Lime for Soil Stabilization.
- D. Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest Edition.
- E. State, City, or County Standards and Specifications, or other requirements.

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.
- M. Rock Fill: Rock fill shall not be used as engineered fill within the building areas. No particle exceeding 4 inches shall be used within 24 inches of the pavement subgrade. A maximum particle size of 18 inches can be used below 24 inches.

2.2 ACCESSORIES

- 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 <u>DEWATERING</u>

- 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 <u>EXPLOSIVES</u>

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.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 ft. Do not disturb bottom of excavations intended for bearing surface.
- 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.

 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. Prior to fill placement, the exposed subgrade shall be densified using a heavy vibratory roller having a maximum static weight of 12,000 lbs. and capable of exerting a minimum impact energy of 20,000 lbs.
- D. 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. Areas exhibiting soil that deflects excessively during proof rolling should be excavated and replaced with compacted backfill, mechanically stabilized by moisture conditioning and compaction, or stabilization with a geosynthetic covered by appropriate compacted backfill. The appropriate method of subgrade stabilization shall be determined by the Owner's on-site geotechnical engineer.
- E. 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, dampproofing, 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

- 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.
 - 2. If ALDOT #57 stone is utilized, then the backfill shall be vibro-compacted with a minimum of 6 passes of a vibratory plate compactor. Dense graded gravel, #8910 or equal, shall be compacted to a minimum compaction requirement of 98% Modified Proctor maximum dry density.
- 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 <u>FILL</u>
 - 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. Keying in/benching of proposed fill slopes into the existing/natural grade is required to a minimum 10' horizontal distance as measured from the proposed toe of slope back to natural grade.
- F. Fill slopes shall be constructed from the bottom up in horizontal lifts, overfilled and then cut back to the planned slope limits so that the entire slope mass (including the slope face) is uniformly compacted with a consistent, uniform slope face.
- G. 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. This work will be at the Contractor's expense.

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).
 - Under structures, building slabs, steps, and pavements, scarify and recompact 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 <u>GRADING</u>

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 SUBBASE AND BASE COURSES

- A. Under pavements and walks, place subbase course on prepared subgrade and as follows:
 - 1. Place base course material over subbase.
 - 2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
 - 3. Shape subbase and base to required crown elevations and cross-slope grades.
 - 4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 - 5. When thickness of compacted subbase or base 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.

B. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.19 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.

3.20 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.
 - 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.

3.21 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.

3.22 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

WATER DISTRIBUTION - 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.
- B. All water mains shall be in strict accordance with the local water authority's requirements.

1.2 <u>SUMMARY</u>

- 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 <u>SUBMITTALS</u>

- 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. <u>COORDINATION</u>

- 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 <u>PIPING MATERIALS</u>

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 <u>PVC PIPE AND FITTINGS</u>

- 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.
 - 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 grayiron 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.
 - Underground Piping, NPS 2 and Larger: AWWA C219, metal, sleevetype 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 250psig 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.
 - 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.
 - 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 <u>GATE VALVES</u>

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 <u>CHECK VALVES</u>

- A. AWWA Check Valves:
 - 1. Check Valves: AWWA C508, swing-check type with 175-psig workingpressure 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 workingpressure 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 airbleed device for access to internal parts, and flanged ends; designed for 175psig 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, flangedend 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.
 - 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.
 - Insulation inside housing.
 - 4) Anchoring devices for attaching housing to concrete base.
 - 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-onjoint 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, nonrisingstem, 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.
- 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 waterservice piping, on main electrical meter panel. See Division 2 Section "Utility Materials" for identifying devices.

3.17 <u>CLEANING</u>

- 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.
- 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

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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.
- B. All sanitary sewerage shall be in strict accordance with the local sanitary sewer authority.

1.2 <u>SUMMARY</u>

- A. This Section includes sanitary sewerage outside the building.
- B. Related Sections include the following"
 - 1. Division 3 Section "Cast-in-Place Concrete" for concrete structures.

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Non-pressure-Piping Pressure Ratings: At least equal to system test pressure.

1.4 <u>SUBMITTALS</u>

- A. Shop Drawings: Include plans, elevations, details, and attachments for the following:
 - 1. Precast concrete manholes, including frames and covers.
- B. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- C. Field Test Reports: Indicate and interpret results for compliance with performance requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.
- B. Handle precast concrete manholes and other structures according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
- B. Locate existing structures and piping to be closed and abandoned.

- C. Existing Utilities: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting, materials.

2.2 PIPES AND FITTINGS

- A. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints
 - 1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
 - 2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
 - 3. Gaskets: AWWA C111, rubber.
- B. PVC Pipe: ASTM D 1785, Schedule 40 PVC, with plain ends for solvent-cemented joints.
 - 1. Fittings: ASTM D 2466, Schedule 40 PVC, socket type.

2.3 MANHOLES

- A. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
 - 1. Diameter: 48 inches minimum, unless otherwise indicated.
 - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
 - 3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.
 - 4. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
 - 5. Top Section: Concentric-cone type, unless eccentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 - 6. Gaskets: ASTM C 443, rubber.
 - 7. Grade Rings: Include two or three reinforced-concrete rings, 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.
 - 8. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.
 - 9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Heavy-Traffic Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints.
 - 1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
 - 2. Gaskets: Rubber.

- 3. Grade Rings: Include two or three reinforced-concrete rings, 6- to 9-inch total thickness, to match 24-inch diameter frame and cover.
- 4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.
- 5. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- C. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings for heavyduty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26inch-diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.
- D. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.
 - 1. Type: Solid.

2.4 <u>CONCRETE</u>

- A. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 2 percent through manhole.

2.5 PROTECTIVE COATINGS

- A. Description: One- or two-coat, coal-tar epoxy; 15-mil (0.38 mm) minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:
 - 1. Concrete Manholes: On exterior and interior surfaces.
 - 2. Manhole Frames and Covers: On entire surfaces.

2.6 <u>CLEANOUTS</u>

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
 - 1. Light Duty: In earth or grass foot-traffic areas.
 - 2. Medium Duty: In paved foot-traffic areas.
 - 3. Heavy Duty: In vehicle-traffic areas.

- 4. Extra-Heavy Duty: In roads.
- 5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 <u>EARTHWORK</u>

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 <u>PIPING APPLICATIONS</u>

- A. General: Include watertight joints.
- B. Refer to Part 2 of this Section for detailed specification for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.
- C. Gravity-Flow Piping: Use the following:
 - 1. Ductile-iron sewer pipe; standard- or compact-pattern, ductile-iron fittings; gaskets; and gasketed joints.
 - 2. PVC pipe; PVC socket type fittings.

3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
 - 1. Use the following pipe couplings for non-pressure applications:
 - a. Sleeve type to join piping, of same size, or with small difference in OD.
 - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
 - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.5 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install piping with 36-in minimum cover.
- F. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installations indicated
- B. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.
- C. Ductile-Iron Sewer Pipe with Ductile-Iron Fittings: According to AWWA C600.
- D. PVC Pipe with PVC Fittings: According to ASTM D 2321 and ASTM F 1668.

3.7 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Form continuous concrete channels and benches between inlets and outlet.
- C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
- D. Install precast concrete manhole sections with gaskets according to ASTM C 891.
- E. Construct cast-in-place manholes as indicated.

3.8 <u>CLEANOUT INSTALLATION</u>

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.9 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished Work strictly complies with local requirements.
- B. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.10 CLOSING ABANDONED SANITARY SEWERAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch- Insert other thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 - 1. Remove manhole and close open ends of remaining piping.
 - 2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
 - 3. Backfill to grade according to Division 2 Section "Earthwork."

3.11 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
 - 1. Place plug in end of incomplete piping at end of day and when work stops.
 - 2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfills is in place, and again at completion of project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball of cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

- 1. Do not enclose, cover, or put into service before inspection and approval.
- 2. Test completed piping systems according to authorities having jurisdiction.
- 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
- 4. Submit separate report for each test.
- 5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
 - a. Sanitary Sewerage: Perform hydrostatic test.
 - 1) Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.
 - 2) Close openings in system and fill with water.
 - 3) Purge air and refill with water.
 - 4) Disconnect water supply.
 - 5) Test and inspect joints for leaks.
 - Option: Test ductile-iron piping according to AWWA C600, "Hydrostatic Testing". Use test pressure of at least 10 psig.
 - b. Sanitary Sewerage: Perform air test according to UNI-B-6.
 - 1) Ductile-Iron Piping: Test according to AWWA C600, Section "Hydraulic Testing."
- 6. Manholes: Perform hydraulic test according to ASTM C 969.
- 7. Leaks and loss in test pressure constitute defects that must be repaired.
- 8. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 02530

SITE CONCRETE WALKS, CURBS & PAVING - SECTION 02751

<u> 1.0 – GENERAL</u>

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 <u>SUMMARY</u>

- 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 <u>SUBMITTALS</u>

- 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 <u>FORMS</u>
 - 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 dielectricpolymer 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 burlappolyethylene 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 ³/₄-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 <u>PREPARATION</u>

- 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 epoxycoated 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.
 - 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 handspading, 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.
- 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.
 - 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:

- 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.
- Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
- 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 floatfinished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - 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.
- 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 compressivestrength 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

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls
 - 3. Slabs-on-grade
 - 4. Concrete toppings
- B. Related Sections include the following:
 - 1. Section 02300 "Earth Work" for drainage fill under slabs-on-grade.
 - 2. Section 02751 for concrete pavement and walks.
 - 3. Division 5 for metals.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Shop Drawings, General:
 - 1. Submit all shop drawings on one reproducible print and two copies only. The reproducible print will be returned. All other reproductions required by the Contractor are the responsibility of the Contractor and shall be made after reproducible is returned.
 - 2. The contractor shall fill out the Concrete Submittal Checklist and include it as part of his mix design and/or shop drawing submittal package(s). Submittals without the checklist will be returned unchecked as an incomplete submittal. The checklist sheet is located at the end of this specification section.
 - a. If there are questions, clarifications, modifications, or other items where information, a response, or approval is requested, such items must be written on the checklist. Only indicating such items on the shop drawings or within the calculations is not sufficient. Where items are not specifically listed on the checklist and subsequently not explicitly approved by the Structural Engineer of Record, such items are not to be considered approved or considered.

- 3. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.
- 4. Contract documents shall not be used for shop drawing, including erection plans or details.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: Prepare design mixes for each type and strength of concrete by either laboratory trial mixtures or field experience methods as specified in ACI 318-05 Section 5.3. If trial mixtures method used, the contractor is to provide and use an independent testing facility for preparing and reporting proposed mix designs.
 - 1. All concrete mix designs shall include the following information:
 - a. Proportions of cement, fine and coarse aggregate and water.
 - b. Water/cement ratio, design strength, slump and air content.
 - c. Type of cement and aggregates.
 - d. Type and dosage of all admixtures.
 - e. Type, color and dosage of integral coloring compounds, where applicable.
 - f. Special requirements for pumping.
 - g. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.
 - h. Dated test data for the laboratory trial mixture or filed experience method.
 - Material certifications (materials shall meet the requirements of section 2.5 below)
 - 1) Cementitious materials.
 - 2) Admixtures.
 - 3) Aggregates
 - 2. Submit written reports to Architect and Structural Engineer of Record 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 and approved by Architect and Structural Engineer of Record.
- D. Contract documents shall not be used for shop drawing, including erection plans or details.
- E. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- F. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
 - 1. Shop drawings for formwork, prepared for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - a. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.
- G. Samples: Submit samples of materials as requested by Architect, including names, sources, and descriptions for waterstops, vapor retarder and other products indicated by Architect.
- H. Welding certificates.

i.

I. Qualification Data: For Installer, manufacturer and testing agency.

- J. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- K. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Fiber reinforcement.
 - 6. Waterstops.
 - 7. Curing compounds.
 - 8. Floor and slab treatments.
 - 9. Bonding agents.
 - 10. Adhesives.
 - 11. Vapor retarders.
 - 12. Semirigid joint filler.
 - 13. Joint-filler strips.
 - 14. Repair materials.
- L. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- M. Field quality-control test and inspection reports.
- N. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACIcertified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. 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.
 - 2. 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.

- D. The Owner shall employ an approved Testing Agency to perform concrete and concrete related tests and inspections (that are not specifically noted as the contractor's responsibility) as required by the Building Code, Project Documents, the Architect, and the Structural Engineer of Record.
- E. The contractor shall employ at his expense an approved Testing Agency as defined above to perform the following:
 - 1. Evaluation of trial mixtures and/or concrete testing for mix design submission.
 - 2. Qualification of proposed materials and establishment of concrete mixtures.
 - 3. Other testing services needed or required by the contractor.
- F. 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.
- G. Testing Responsibilities of the Contactor:
 - 1. Submit data on qualifications of Contractor's proposed testing agency. Use of testing services will not relive the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
 - 2. Furnish any labor necessary to assist Owner's testing agency in obtaining and handling samples at the project site or at the source of materials.
 - 3. Advise Owners Testing Agency at least 24 hours in advance of operations to allow for completion of quality tests and assignment of personnel.
 - 4. At the Contractor's expense, provide and maintain for the sole use of the Owner's Testing agency adequate facilities for the safe storage and proper curing of concrete test specimens on the project site for initial curing as required by ASTM C31.
- H. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- I. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- J. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 302 "Guide for Concrete Floor and Slab Construction".
 - 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 - 5. ACI 305 "Hot Weather Concreting".
 - 6. ACI 306 "Cold Weather Concreting".
 - 7. ACI 309 "Guide for Consolidation of Concrete".
 - 8. ACI 347 "Recommended Practice for Concrete Formwork".
 - 9. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- K. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

- L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.

- d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- E. 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, and adhesion of membranes to concrete.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) ASTM A 706/A 706M, deformed bars, ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) ASTM A 706/A 706M, deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- D. Plain-Steel Wire: ASTM A 82, as drawn.
- E. Deformed-Steel Wire: ASTM A 496.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- G. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

- A. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- B. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I, gray or white. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or F.
 - Limit use of fly ash to not exceed 25 percent of cementitious content by weight.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 1) Limit use of Ground Granulated Blast-Furnace Slag to not exceed 50 percent of cementitious content by weight.
 - Blended Hydraulic Cement: ASTM C 595, Type [IS, portland blast-furnace slag] [IP, portland-pozzolan] [I (PM), pozzolan-modified portland] [I (SM), slag-modified portland] cement.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. Use of admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C. Set-Accelerating Corrosion-Inhibiting Admixtures must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
 - 1. Available Products:
 - a. Boral Material Technologies, Inc.; Boral BCN.
 - b. Euclid Chemical Company (The); Eucon CIA.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI.
 - d. Master Builders, Inc.; Rheocrete CNI.
 - e. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-setaccelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. Non-Set-Accelerating Corrosion-Inhibiting Admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal.
 - 1. Available Products:
 - a. Axim Concrete Technologies; Catexol 1000CI.
 - b. Boral Material Technologies, Inc.; Boral BCN2.
 - c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - d. Master Builders, Inc.; Rheocrete 222+.
 - e. Sika Corporation; FerroGard-901.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis. See architectural drawings and site plan for concrete requiring color pigment.
 - 1. Available Manufacturers:
 - a. Bayer Corporation.
 - b. ChemMasters.
 - c. Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
 - d. Davis Colors.
 - e. Elementis Pigments, Inc.
 - f. Hoover Color Corporation.
 - g. Lambert Corporation.

- h. Scofield, L. M. Company.
- i. Solomon Colors.
- 2. Color: As selected by Architect from manufacturer's full range.

2.7 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - 1. Available Manufacturers:
 - a. Bometals, Inc.
 - b. Greenstreak.
 - c. Meadows, W. R., Inc.
 - d. Tamms Industries, Inc.
 - e. Vinylex Corp.
 - 2. Profile: As indicated.
 - 3. Dimensions: As indicated; nontapered.

2.8 VAPOR RETARDERS

- A. Underslab Vapor Barrier 1: 15 mil minimum thickness, Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced, high density polyethylene, or polyolefin equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
 - Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
 Resis of Design Broduct:
 - 2. Basis of Design Product:
 - a. STEGO INDUSTRIES LLC Product Stego Wrap (15-mil) Vapor Barrier ; www.stegoindustries.com
 - 3. Other Acceptable products
 - a. Fortifiber Building Systems Group Product Moistop Ultra® 15; www.fortifiber.com.
 - b. Reef Industries Product Griffolyn 15 Mil ; www.reefindustries.com.
 - c. W.R. Meadows Inc. Product PERMINATOR 15 ; <u>www.wrmeadows.com</u>.
 - d. Substitutions: See Section 01 6000 Product Requirements.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.9 FLOOR AND SLAB TREATMENTS

- A. General: The contractor shall coordinate and insure that all floor and slab treatments, curing materials and compounds, finish floor materials, related materials, paints, and repair compounds are compatible.
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces. To be applied where concrete indicated to be sealed in Architectural Drawings.
 - 1. Available Products:
 - a. Burke by Edoco; Titan Hard.
 - b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
 - c. Dayton Superior Corporation; Day-Chem Sure Hard.
 - d. Euclid Chemical Company (The); Euco Diamond Hard.
 - e. L&M Construction Chemicals, Inc.; Seal Hard.
 - f. Meadows, W. R., Inc.; Liqui-Hard.
 - g. Nox-Crete Products Group, Kinsman Corporation; Duranox.
- C. For additional information on color stained concrete see 03032 Color Stained concrete specifications.

2.10 CURING MATERIALS

- A. General: The contractor shall coordinate and insure that all floor and slab treatments, curing materials and compounds, finish floor materials, related materials, paints, and repair compounds are compatible. Evaporation retarder shall not be used where epoxy floor covering is to be placed; slab shall be wet cured with Absorptive Cover or Moisture-Retaining Cover as indicated below.
 - 1. The contractor shall verify and be responsible for insuring the VOC emission limits of authorities having jurisdiction are not exceeded during the project.
- B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Available Products:
 - a. Burke by Edoco; BurkeFilm.
 - b. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - c. Dayton Superior Corporation; Sure Film.
 - d. Euclid Chemical Company (The); Eucobar.
 - e. L&M Construction Chemicals, Inc.; E-Con.
 - f. Meadows, W. R., Inc.; Sealtight Evapre.
 - g. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - h. Sika Corporation, Inc.; SikaFilm.
- C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

- D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet or natural fiber matting attached to plastic sheet backing. Acceptable product is Aquacure by DRC, exclusive distributor Greenstreak Group, Inc. 800-325-9504, or equal.
- E. Water: Potable.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Review curing compounds with manufacturer and waterproofing manufacturer to make sure curing compound does not inhibit adhesion.
 - 1. Available Products:
 - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
 - b. Burke by Edoco; Aqua Resin Cure.
 - c. ChemMasters; Safe-Cure Clear.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
 - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
 - f. Euclid Chemical Company (The); Kurez DR VOX.
 - g. Kaufman Products, Inc.; Thinfilm 420.
 - h. Lambert Corporation; Aqua Kure-Clear.
 - i. L&M Construction Chemicals, Inc.; L&M Cure R.
 - j. Meadows, W. R., Inc.; 1100 Clear.
 - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
 - I. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
 - m. Tamms Industries, Inc.; Horncure WB 30.
 - n. Unitex; Hydro Cure 309.
 - o. US Mix Products Company; US Spec Maxcure Resin Clear.
 - p. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Available Products:
 - a. Anti-Hydro International, Inc.; AH Clear Cure WB.
 - b. Burke by Edoco; Spartan Cote WB II.
 - c. ChemMasters; Safe-Cure & Seal 20.
 - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
 - e. Dayton Superior Corporation; Safe Cure and Seal (J-18).
 - f. Euclid Chemical Company (The); Aqua Cure VOX.
 - g. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
 - h. Lambert Corporation, Glazecote Sealer-20.
 - i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure.
 - I. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 150E.
 - m. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
 - n. Tamms Industries, Inc.; Clearseal WB 150.
 - o. Unitex; Hydro Seal.
 - p. US Mix Products Company; US Spec Hydrasheen 15 percent
 - q. Vexcon Chemicals, Inc.; Starseal 309.

- H. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Available Products:
 - a. Burke by Edoco; Spartan Cote WB II 20 Percent.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; High Seal.
 - d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
 - e. Euclid Chemical Company (The); Diamond Clear VOX.
 - f. Kaufman Products, Inc.; SureCure Emulsion.
 - g. Lambert Corporation; Glazecote Sealer-20.
 - h. L&M Construction Chemicals, Inc.; Dress & Seal WB.
 - i. MBT Protection and Repair, Div. of ChemRex; MasterKure-N-Seal VOC.
 - j. Meadows, W. R., Inc.; Vocomp-20.
 - k. Metalcrete Industries; Metcure 0800.
 - I. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 200E.
 - m. Sonneborn, Div. of ChemRex; Kure-N-Seal.
 - n. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
 - o. Tamms Industries, Inc.; Clearseal WB STD.
 - p. Unitex; Hydro Seal 18.
 - q. US Mix Products Company; US Spec Radiance UV-25
 - r. Vexcon Chemicals, Inc.; Starseal 0800.
- I. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. Available Products:
 - a. Burke by Edoco; Cureseal 1315.
 - b. ChemMasters; Spray-Cure & Seal Plus.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315.
 - d. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
 - e. Euclid Chemical Company (The); Super Diamond Clear.
 - f. Kaufman Products, Inc.; Sure Cure 25.
 - g. Lambert Corporation; UV Super Seal.
 - h. L&M Construction Chemicals, Inc.; Lumiseal Plus.
 - i. Meadows, W. R., Inc.; CS-309/30.
 - j. Metalcrete Industries; Seal N Kure 0.
 - k. Sonneborn, Div. of ChemRex; Kure-N-Seal 5.
 - I. Tamms Industries, Inc.; LusterSeal 300.
 - m. Unitex; Solvent Seal 1315.
 - n. US Mix Products Company; US Spec CS-25
 - o. Vexcon Chemicals, Inc.; Certi-Vex AC 1315
- J. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. Available Products:
 - a. Burke by Edoco; Cureseal 1315 WB.
 - b. ChemMasters; Polyseal WB.

- c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
- d. Euclid Chemical Company (The); Super Diamond Clear VOX.
- e. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
- f. Lambert Corporation; UV Safe Seal.
- g. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
- h. Meadows, W. R., Inc.; Vocomp-30.
- i. Metalcrete Industries; Metcure 30.
- j. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.
- k. Tamms Industries, Inc.; LusterSeal WB 300.
- I. Unitex; Hydro Seal 25.
- m. US Mix Products Company; US Spec Radiance UV-25.
- n. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.
- K. For additional information on finishing and sealing floor surfaces to receive color stained concrete see COLOR STAINED CONCRETE RESURFACING SECTION 03032

2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 typically unless noted or aromatic polyurea at traffic areas with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Concrete type, slump, air content, and maximum water to cementitious content shall be as shown on the Structural Drawings.
- C. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 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.
 - 5. Silica Fume: 10 percent.
 - 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use of admixture must be approved by the Structural Engineer of Record. Include admixtures as part of mix design submittal
 - 2. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 3. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

- 4. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- 5. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- F. Slump Limits: Proportion and design mixes to result in slump at point of placement as shown on the drawings.
 - 1. 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 permitted, concrete shall have a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.
- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Building Members: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: As indicated in drawings.
 - 2. Maximum Water-Cementitious Materials Ratio: As indicated in drawings.
 - Slump Limit: As indicated in drawings. 8 inches (200 mm), plus or minus 1 inch (25 mm), for concrete with verified slump indicated in drawings before adding high-range waterreducing admixture or plasticizing admixture].
 - 4. Air Content: As indicated in drawings, at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

2.15 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. Mixing and delivery time shall not exceed 90 minutes.
 - When air temperature is between 85 and 90 deg F (30 and 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.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

- 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Convene preconstruction meeting prior to starting work. Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" and Structural Drawings for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
- G. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls no further than 90' on center. Locate joints midway between piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete
when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

- 3. Slab reinforcement shall not cross contraction joints.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.7 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with the recommendations and intent of ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301. Deliver concrete to meet the following minimum temperatures immediately after placement:
 - a. 55 deg F for sections less than 12in. in the least dimension.
 - b. 50 deg F for sections 12in. to 36in. in the least dimension.
 - c. 45 deg F for sections 36in. to 72in. in the least dimension.
 - d. 40 deg F for sections greater than 72in. in the least dimension.
 - e. The temperature of concrete as placed shall not exceed these values by more than 20 deg F.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

- 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with the recommendations and intent of ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bullfloated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
 - 1. Apply scratch finish to surfaces indicated by Architect and to receive concrete floor toppings, to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - Apply float finish to surfaces indicated by Architect to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sandbed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

- 1. Apply a trowel finish to surfaces indicated by Architect, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-ongrade.
- 3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated by Architect, where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiberbristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate or aluminum granules over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 - 2. After broadcasting and tamping, apply float finish.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.
- H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
 - 1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
 - 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 - 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-

place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations and intent of ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m 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. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
- Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
- 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions to concrete floors indicated in Architectural Drawings to be troweled and sealed.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than seven days' old unless otherwise required by manufacturer.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt,

and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu, yd. (76 cu, m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 6. 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.

- 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
- 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days. Compression test specimens for days not specified shall be at the contractors expense.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
- 9. When strength of field-cured cylinders is less than 85 percent of companion laboratorycured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Structural Engineer of Record but will not be used as sole basis for approval or rejection of concrete.
- 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete at the Contractor's expense when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Structural Engineer of Record. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 15. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

CONCRETE SUBMITTAL CHECKLIST

This submittal checklist must be provided with all concrete and reinforcing steel packages that are to be submitted to Structural Design Group. Absence of a properly completed checklist may result in the return of the submittal unchecked or as revise and resubmit.

MIX DESIGN			
Included?	Description	Location in project documentation where this requirement is located.	
	Field data or trial mixture strength data	Spec Section 03300, Part I, Subsection 1.4	
	 Verify Mix Design Constraints Limit Fly Ash to 25% Limit Proportions per Spec Section 03300, Part II, Subsection 2.5 W/C ratio, Air, Slump per General Notes Mix Design Data: Proportions of cement, fine and coarse aggregate and water. Water/cement ratio, design strength, slump and air content. Type of cement and aggregates. Type, color and dosage of integral coloring compounds, where applicable. Special requirements for pumping. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified. Material certifications Cementitious materials. Aggregates . 	Spec Section 03300, Part II, Subsection 2.5 General Notes – Section 4.0 Spec Section 03300, Part I, Subsection 1.4 Spec Section 03300, Part I, Subsection 2.5, 2.6	
REBAR SHOP DRAWINGS			
Included?	Description	Location in project documentation where this requirement is located.	
	Submit all shop drawings on one reproducible print and two reproductions only.	General Notes - Section 2.0 Spec Section 03300, Part I, Subsection 1.4	
	Contract documents not used for shop drawing.	Spec Section 03300, Part I, Subsection 1.4	
	Resubmitted shop drawings have all revised items clouded or identified.	Spec Section 03300, Part I, Subsection 1.4	
	Any requested information, clarifications, requests for approvals, modifications, etc. as listed in Spec Section 03300, Part I, Subsection 1.4 are included by the contractor below.	Spec Section 03300, Part I, Subsection 1.4	

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FORMWORK, RE-SHORE, OTHER SHOP DRAWINGS			
Included?	Description	Location in project documentation	
		where this requirement is located.	
	Submit all shop drawings on one reproducible print	General Notes - Section 2.0	
	and two reproductions only.	Spec Section 03300, Part I, Subsection	
		1.4	
	Contract documents not used for shop drawing,	Spec Section 03300, Part I, Subsection	
	including erection plans or details	1.4	
	Resubmitted shop drawings have all revised items	Spec Section 03300, Part I, Subsection	
	clouded or identified.	1.4	
	Any requested information, clarifications, requests	Spec Section 03300, Part I, Subsection	
	for approvals, modifications, etc. as listed in Spec	1.4	
	Section 03300, Part I, Subsection 1.4 are included		
	by the contractor below.		
	Calculations stamped by an Engineer registered in	Spec Section 03300, Part I, Subsection	
	the state where the project is located.	1.4	
QUESTIONS, ETC. PER SECTION 03300, PART I, SUBSECTION 1.4			

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END OF SECTION 03300

1.0 - GENERAL

- 1.1 <u>Related Documents</u>
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 <u>Summary</u>
 - 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 <u>Submittals</u>
 - 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.

- 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.
- 1. 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 <u>Special Markings</u>
 - 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.
 - 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 <u>Manufacturers</u>

- 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 <u>Concrete Masonry Units</u>

- 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
 - Aggregates: Do not use aggregate made from pumice, scoria or tuff.
 - 4. Provide Type N-I moisture-controlled units
 - 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.
- 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. 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.
- C. 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 coldweather 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.
 - 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.
 - 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:
 - 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 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.

2.9 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.

2.10 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.

2.11 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. <u>MORTAR IN CONTACT WITH COPPER PIPING WILL NOT BE ACCEPTED</u>. 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. Lay CMU in running 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 onehalf 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.
 - 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.
 - 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.
 - 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 <u>Cavities</u>

- 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.
 - 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. Buildin 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 and 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, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.

- 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
- 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- 5. Contract documents shall not be used for shop drawing, including erection plans or details.
- 6. All shop drawings which are resubmitted for any reason shall have all revised items clouded or identified for each submittal.
- 7. All structural steel connections not specifically detailed on the drawings shall be designed to resist forces indicated, by the Contractor.
- 8. For structural-steel connections indicated to comply with design loads, include structural analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.
- 9. For each connection, the following shall be noted on the shop drawings:
 - a. Required design reaction
 - b. Calculation sheet number for design
 - c. Capacity of detailed connection
 - d. Stamp of Engineer submitting calculations for the connection
- 10. All shop drawings which do not provide this information will be returned unchecked as an incomplete submittal.
- 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 Job No. 22-131 05120 - 2

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.

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.
 - 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.
 - 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.
- C. Painting of steel exposed to weathering in the finished configuration of the structure:
 - 1. Surface Preparation: Clean surfaces to be painted. Remove rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.

2. Prime Coat: Immediately after surface preparation, provide one coat of grey shop applied Organic Zinc Rich Urethane Primer, such as Tnemec 90-97, at 2.5 to 3.5 mils DFT which meets the following performance requirements:

- b. Zinc Content: 83% y weight.
- c. Salt Spray (Fog): ASTM B 117, Scribed Panels, 50,000 hours exposure.
- d. Adhesion: ASTM 4541 Type V no less than 2,083 psi(14.36 MPa) pull.
- e. Prohesion: ASTM G85 Prohesion Cabinet Testing. 15,000 hours.
- f. Cathodic Disbondment: ASTM G8, Method A.
- g. Immersion: ASTM D 870 Potable Water Immersion. 7 year exposure.
- h. AISC Static Fatigue: Primer shall meet requirements of a Class B surface with a mean slip coefficient no less than 0.50 and a tension creep not in excess of .005 inch over SSPC-SP6 prepared substrate.
- 3. Touch Up Primer/Preparation before Finish Coats: Immediately after erection all surfaces shall be cleaned per SSPC SP1 followed by spot repair preparation of SSPC-SP11 Power tool clean to white metal. Remove all foreign materials and contaminates, clean field welds, bolted connections, and abraded areas of shop paint. All damaged and abraded areas shall have feathered edges. Field touch-up with one coat of Prime Coat, paint applied at 2.5-3.5 Mils DFT prior to finish coat.
- 4. Intermediate Coat: Provide one grey finish coat of an Aliphatic Acrylic Polyurethane, such as Tnemec Series 1075 Endura-Shield II, at 3.0 to 5.0 mils DFT which meets the following performance requirements:
 - a. Solids by Volume: 71%
 - b. Salt Spray (Fog): ASTM B 117, 2,000 hours exposure.
 - c. Abrasion: ASTM 4060 (CS-17 Wheel, 1,000 gram load, 1,000 cycles). No more than 139 mg loss.
 - d. Adhesion: ASTM 4541 no less than 1,423 psi(9.81 MPa) pull.
 - e. Flexibility: ASTM D 522 (Method A) no less than 14.4% elongation.
 - f. Hardness: ASTM 3363- no gouging with an HB or less pencil.
 - g. Humidity: ASTM 4585- 4,000 hours exposure.
 - h. Impact: ASTM B 2794 no cracking or delamination of film after 35 inch-pounds direct impact.
 - i. Prohesion: ASTM G85 10,000 hours exposure.
- 5. Finish Coat: Provide one finish coat (color to be selected by architect) of an Advanced Thermoset Solution Fluoropolymer, such as Tnemec Series 1070 Fluoronar, at 2.0 to 3.0 mils DFT which meets the following performance requirements:
 - a. Solids by Volume: 60%
 - b. Salt Spray (Fog): ASTM B 117 10,000 hours exposure
 - c. Abrasion: ASTM 4060 (CS-17 Wheel, 1,000 gram load, 1,000 cycles) no more than 103 mg loss.
 - d. Adhesion: ASTM 4541 Type V no less than 1,930 psi(13.3 MPa) pull.
 - e. Flexibility: ASTM D 522 (Method A)- no less than 14.83% elongation.
 - f. Hardness: ASTM 3363 no gouging with an 8H or less pencil.
 - g. Humidity: ASTM 4585 3,000 hours exposure.
 - h. Impact: ASTM B 2794 no cracking or delamination of film after 35 inch-pounds direct impact.
- 6. Any Field Painting to be brush or roller applied.
- 7. Owners testing agent to continuously review the surface preparation and application of the painting of steel exposed to weathering in the finished configuration of the structure.

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 Job No. 22-131 05120 - 7

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.

- 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.

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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 the following:
 - 1. Roof deck.
- B. Related Sections include the following:
 - 1. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 2. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 3. Division 09 painting Sections for repair painting of primed deck.

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 including manufacturer's specifications and installation instructions for each type of decking and accessories.
 - 1. Provide test data for mechanical fasteners used fastening deck to supporting structures.
- C. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
 - 1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. American Welding Society (AWS), D1.3 "Structural Welding Code Sheet Steel."
 - Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."

- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
 - Welded decking in place is subject to inspection and testing. General Contractor will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be unsatisfactory. Remove work found to be defective and replace with new acceptable work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:
 - 1. Bowman Metal Deck Div., Cyclops Corp.
 - 2. Consolidated Systems, Inc.
 - 3. Epic Metals Corp.
 - 4. Marlyn Steel Products, Inc.
 - 5. H. H. Robertson Co.
 - 6. Roll Form Products, Inc.
 - 7. Roof Deck, Inc.
 - 8. United Steel Deck, Inc.
 - 9. Vulcraft Div., Nucor Corp.
 - 10. Wheeling Corrugating Co.

2.2 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- D. Galvanizing: ASTM A 525, G60.
- E. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.3 PRODUCTS

- A. ROOF DECK.
 - Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 3. Deck Profile: SEE PLAN
 - 4. Profile Depth: SEE PLAN
 - 5. Design Uncoated-Steel Thickness: SEE PLAN
 - 6. Span Condition: Triple Span or MORE.
 - 7. Side Laps: Overlapped or butted over support at contractor's option

.2.4 ACCESSORIES:

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- C. Mechanical Fasteners: Corrosion-resistant self-drilling, self-threading screws.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factorypunched hole of 3/8-inch minimum diameter.
- H. Shear Connectors: ASTM A 108, Grades 1010 through 1020 headed stud type, cold-finished carbon steel, AWS D1.1, Type B, with arc shields.
- I. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members AS INDICATED IN DRAWINGS:
 - 1. Anchor Diameter: SEE PLAN.
 - 2. Screw Spacing: SEE PLAN
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps as noted on drawings. Fasten perimeter edges of at intervals not exceeding 12" and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws or 5/8" diameter puddle welds as indicated on drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
- F. Test all weld studs according to applicable standards.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310.

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 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.
 - c. Drag strut 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, metalstud 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 REFERENCES

- A. ASTM A 780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- B. ASTM A 1003 Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.

- C. ASTM B 633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- D. ASTM C 955 Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- E. ASTM C 1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- F. ASTM C1007 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- G. ASTM C 1513 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- H. AISC Steel Construction Manual.
- I. AISI Specification for the Design of Cold-Formed Steel Structural Members; 1996.
- J. AWS D.1.3 Structural Welding Code Sheet Steel.

1.4 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.
 - 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.
 - b. Engineering provided by manufacturer shall be a complete package similar to the "Works" package provided by Aegis Metal Framing or equal. Package to include at a minimum, but not limited to the following:
 - 1) Professional Engineer seal on shop drawings and calculations.
 - 2) Design of all trusses including special trusses such as drag strut trusses, blocking trusses and eave blocking to resist lateral load specified to be transferred from the roof diaphragm to the structural system.
 - 3) All truss to truss connections and all trusses to support connections.
 - 4) Permanent Bracing layout diagrams with connection requirements showing bracing sections and details.
 - 5) Construction Bracing (lateral and diagonal) Layout Diagrams for bottom chord plane, web plane and top chord plane showing bracing sections and details.
 - 6) Minimize Construction Bracing by incorporating Permanent Bracing into the construction bracing where possible.

- 2. Design Loads: As follows:
 - a. Dead Loads: Weights of materials and construction.
 - b. Roof Live Loads: 20 PSF
 - c. Snow Loads: As indicated in drawings.
 - d. Wind Loads: As indicated in drawings.
 - e. Seismic Loads: As indicated in drawings.
 - f. 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 120 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."

1.5 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.

1.6 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."

1.7 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.

1.8 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 carbonsteel 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.
 - 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 wallframing 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 054000

MISCELLANEOUS METALS - SECTION 05500

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

Furnish and install all miscellaneous metals as indicated on drawings, including that shown only on Architectural Drawings, and/or as specified.

1.2 <u>Submittals</u> 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 <u>Substitutions</u>

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. <u>Miscellaneous Steel Lintels.</u> 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. Interior and Exterior Round Member Stair And Ramp Handrail, Guardrails and Brackets as indicated and detailed. Handrail to be 3 ft. min. Wood handrail under CARPENTRY - SECTION - 06210.
- D. <u>Protective Bollards</u> 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.
- E. <u>Stair Nosings-Treads</u> for concrete filled steel pan stairs and concrete stairs on grade slab shall be equal to American Safety Tread Co., Helena, Alabama, Abrasive Cast Metal Nosing # 820, full width of stairs with anchor devices as recommended by the manufacturer.
- F. Expansion Joint Systems (As Indicated and/or as required)
 - <u>Floor to floor expansion joint system</u> shall be flush type as approved equal to Model GFT - RFX as manufactured by C/S System Corporation or Model TMB Series as manufactured by Nystrom.
 - a. Floor to floor expansion joints shall be provided with a 2 hr. fire barrier component as approved equal to ARe-Flex@, Between

floor series as manufactured by C/S Systems Corporation.

- 2. <u>Wall to Wall expansion joint system</u> (As Indicated and/or as required)
 - a. Shall be surface mount type as approved equal to Wall-to-Wall Joint Systems. Basis-of-Design Product: Construction Specialties, Inc. Model SFW. Type: Vertical cover plate. Exposed Metal: Aluminum. Finish: Class II, clear anodic.
 - Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction. Typical: Wall to wall expansion joints shall be provided with a 2 hr. fire barrier component as approved equal to "Re-Flex" by Construction Services or "Pyro-Flex" by MM Systems Corporation.
 - c. Moisture Barrier Manufacturer's Standard

3.0 - EXECUTION

- 3.1 <u>Fabrication</u>
 - 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 <u>Scope</u> The work under this section consists of all rough carpentry work.
- 1.2 <u>General</u>
 - 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.
- 2.3 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.
- 2.4 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.

2.5 <u>Temporary Closures</u>

Provide batten doors with locks at all exterior openings. Appropriate protection against weather and life safety shall be maintained throughout the job.

2.6 Blocking

Provide solid blocking at all grab bars, millwork cabinets and wall mounted units. Coordinate with Installer and/or Manufacturer.

- 2.7 <u>Building Wrap</u> Provide building wrap over exterior surface of all exterior walls as recommended by manufacturer. Building Wrap shall be approved equal to Tyvek.
- 2.8 <u>Air /Moisture Barrier</u> 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.

END OF SECTION

FINISH CARPENTRY - SECTION 06210

1.0 - GENERAL

- 1.1 <u>Scope</u>
 - 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 <u>Submittals</u>
 - 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 semiexposed 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 <u>General</u>

- 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
 - 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. <u>Melamine is not acceptable unless</u> 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. <u>Wood Base and Shoe Mould</u> 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. <u>MDF (Medium Density Fiberboard)</u> 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. <u>Panels</u> 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. <u>Doors</u> Construction of 3/4" Birch plywood, "Good" grade or plastic laminate covered particle board as approved. All edges shall be self edge.
 - D. <u>Drawers</u> 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. <u>Backs</u> 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. <u>Adjustable Shelves</u> 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. <u>Cabinet Base</u> 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. <u>Finishes</u> Tops, edges, and backsplashes and any other areas noted shall be plastic laminate covered.
 - I. <u>Cabinet Hardware</u> 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 <u>Scope</u> The work under this section consists of thru-wall flashing.
- 1.2 <u>Submittals</u> Submit for approval all materials proposed for use under this section.

2.0 - PRODUCTS

2.1 Flashing (Masonry)

Flashing shall be Polyvinyl Chloride, 30 mil (.030") waterproof sheeting equal to Wire-Bond or other pre-approved product.

<u>Flashing (Non-Masonry)</u> Flashing shall be a self-adhering flexible membrane consisting of Elvaloy thermoplastic resin with the following physical properties:

Tensile Strength: 2000 psi per ASTM D412 Ultimate Elongation: 25 percent Shore A Hardness: 83 per ASTM D 2240 Corners and End Dams; preformed shapes

Acceptable Manufacturers: Flex Flash – as manufacture by Hohmann & Barnard, Inc. or pre-approved equal.

Surface Adhered Membrane with Drip - as manufactured by Hyload Flashings

DuPont Thru-Wall Flashings - as manufactured by DuPont Chemical Co.

2.2 Adhesive & Primers

Adhesive & primers for bonding and splicing shall be as recommended by the manufacturer of the material used.

3.0 - EXECUTION

3.1 Extent

Wall flashing shall generally be installed continuous at each floor level, over exterior wall openings, under sills, and at other locations as indicated and as required.

3.2 Installation

- A. All surfaces to receive the flashing shall be reasonably smooth, free from irregularities and primed as recommended by manufacturers installation instructions. On all masonry surfaces, the flashing shall be laid continuously in a fresh bed of mortar above and below. Only at non-masonry vertical surfaces shall flashing be affixed continuously with adhesive and term bar to hold flashing in place.
- B. At grade level floors, thru-wall flashing shall exit finish veneer minimum one course below finish floor and below weep holes.

END OF SECTION

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1.0 - GENERAL

1.1 <u>Related Documents</u>

The Bidding Requirements, Contracting Requirements, and applicable parts of Division 1 - General Requirements, as listed in the Index, shall be included in and made a part of this Section.

- 1.2 Summary
 - A. Provide consistent firestop caulking and sealing systems of an approved material, or combination of materials installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers in accordance with the requirements of the applicable Building Codes for this project.
 - B. Trade specific components of rated assemblies shall be provided by applicable trades as specified elsewhere including, but not limited to: fire dampers, pipe collars, sleeves, etc.
 - C. Fire caulking and sealant shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain penetrations.
 - 2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
 - 3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.
 - 4. Joints in fire-resistance-rated assemblies to allow independent movement.
 - 5. Perimeter Fire Barrier System between a rated floor/roof and an exterior wall assembly.
 - 6. Joints, through penetrations and membrane penetrations in Smoke Barriers and Smoke Partitions.
 - 7. Edge joints and intersection of rated building components.
- 1.3 Related Work

Examine Contract Documents for requirements that affect Work of this Section. Other Specification Section that relate directly to Work of this Section include, but are not limited to:

Division 3 - Concrete Division 4 - Unit Masonry Division 9 - Gypsum Wallboard Division 15 - Mechanical Division 16 - Electrical

1.4 <u>References</u>

Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

- A. American Society for Test and Materials (ASTM).
 - 1. E 84 Test Method for Surface Burning Characteristics of Building Materials
 - 2. E 119 Test Method for Fire Tests of Building Construction and Materials
 - 3. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at
 - 750 degrees F.
 - 4. E 814 Fire Tests of Through-Penetration Fire Stops
 - 5. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths
 - 6. E 1966 Test Method for Resistance of Building Joint
 - 7. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops
 - 8. E 05.11.14 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA); ASTM permanent number assignment pending approval of Draft.
- B. Factory Mutual (FM) Research:
 FM Approval Standard of Firestop Contractors Class 4991
- C. Firestop Contractors International Association (F.C.I.A.): M.O.P. Manual of Practice
- D. International Firestop Council (IFC):
 - 1. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgements (April 2001)
 - 2. Ref. 2 Inspectors Field Pocket Guide
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electric Code
 - 2. NFPA 101 Life Safety Code
 - 3. NFPA 221 Fire Walls and Fire Barriers (preliminary to be released)
 - 4. NFPA 251 Fire Tests of Building Construction and Materials
- F. Underwriters Laboratories, Inc. (UL):
 - 1. UL 263 Fire Tests of Building Construction and Materials
 - 2. UL 723 Surface Burning Characteristics of Building Materials
 - 3. UL 1479 Fire-Tests of Through-Penetration Fire Stops
 - 4. UL 2079 Tests for Fire Resistance of Building Joint Systems

1.5 <u>System Performance Requirements</u>

- A. <u>Penetrations</u>: Provide firestopping systems that are produced to resist the spread of fire, and the passage of smoke and other gases according to requirements indicated, including, but not limited, to the following:
 - 1. Penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.
 - 2. Seal all open conduits at penetration and open end.
 - 3. Penetration sleeves.

- B. <u>Fire Resistive Joints</u>: Provide joint systems with fire-resistance ratings indicated, as determined per UL 2079 or (ASTM E 1399 and E 1966), but not less than the fire-resistance rating of the construction in which the joint occurs.
- C. For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

1.6 <u>Submittals</u>

A. Submit Manufacturer's Product Data Sheets for each type of product selected. Certify that Firestop Material shall be asbestos free and complies with local regulations.

Certification by Firestopping Manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.

- B. Submit system design listings, including illustrations from a qualified testing and inspection agency that is applicable to each firestop configuration.
- C. Submit contractor qualifications as noted in "Quality Assurance" article, listed below.
- D. Refer to and comply with applicable sections of Submittals Section 01350.

1.7 Quality Assurance

A. <u>Fire-Test-Response Characteristics</u>: Provide firestopping System Design Listing by a testing and inspection agency in accordance with the appropriate ASTM Standard(s) per Article 1.5. A qualified testing and inspection agency may be UL, FM Research, Intertek Testing Services, Omega Point Laboratories (OPL) or another agency performing testing and follow-up inspection services for firestop materials that is acceptable to the authority having jurisdiction.

B. <u>Contractor Qualifications</u>:

- 1. FM approved in accordance with FM Standard 4991 Approval of Firestop Contractors.
- 2. Licensed by the State or local authority, where applicable.
- 3. Shown to have successfully completed comparable scale projects.
- 4. Firestop Contractors International Association Contractor Member in good standing.
- C. <u>Single Source Responsibility</u>: Provide firestop caulking and sealing for each kind of penetration and construction condition indicated from a single manufacturer.
 - 1. Materials of different manufacture shall not be intermixed in the same firestop system or opening.
 - 2. Tested and listed firestop systems are to be used.
- D. <u>Field Mockup</u>: Prior to installing firestopping, demonstrate qualities of materials and execution.

- 1. Notify Architect in advance of the dates and times when mockups will be installed.
- 2. Obtain Architect's acceptance before continuing Work.
- 3. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work. Accepted mockups may become part of completed unit of Work.

1.8 Delivery, Storage and Handling

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer.
- B. Store and handle firestopping materials in accordance with manufacturers' written instructions.

1.9 Project Conditions

Environmental Conditions: Install firestopping in accordance with manufacturers' written instructions.

- 1.10 Sequencing and Scheduling
 - A. Project coordination is essential to inform and educate all the parties involved with the firestopping process of their role and how they can affect firestopping on the project. These details shall be included during the Subcontractor's progress meetings.
 - B. Do not cover up firestopping installations until Owner's inspection agency or the Authorities Having Jurisdiction have examined each installation.

1.11 Environmental Regulations

- A. All materials shall be asbestos free and comply with local VOC Regulations.
- B. If required, hazardous disposal of firestop materials shall be strictly observed as noted on the individual MSDS.

2.0 - PRODUCTS

- 2.1 Firestopping General
 - A. Approved products are:
 - 3M, STI, Dow-Corning, Hilti, and Tremco. Bidders may submit data to the Architect no later than ten (10) days prior to bid date for consideration of other manufacturers' products. Requirements for submittals must comply with 1.6 - Submittals, listed below, and as indicated in <u>Submittals - Section</u> 01350.
 - 2. Firestop products produced by FCIA Manufacturer Members in good standing.

 Mineral wool fiber safing pre-approved equal to IIG MinWool - 1200 Safing. High Temperature Insulation with 4" thickness, FSP vapor retarder on one side, Mildew resistant and will not support corrosion. Three hour fire resistance and noncombustible per ASTM E136.

3.0 - EXECUTION

3.1 Examination

Examine substrates and conditions affecting performance of firestopping. Notify the responsible party or parties of any unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 <u>Preparation</u>

- A. <u>Priming</u>: Prime substrates where recommended by Firestopping Manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.
- B. <u>Masking Tape</u>: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.

3.3 Installation

A. <u>General</u>: Comply with the "System Performance Requirements" and with the Firestop Manufacturer's installation instructions.

Install joint fillers to provide support of firestop materials during application and at the position required to produce the cross-sectional shapes and depths to allow optimum sealant movement.

- B. Completely fill recesses provided for each joint configuration; providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.
- C. Tool non-sag firestop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to eliminate air pockets and to ensure contact and adhesion with sides of joint.

3.4 Field Quality Control

- A. Perform a general walk through inspection with the General Contractor and applicable Subcontractors prior to Architect's major inspections to assure completeness of the work. All work is subject to Architect's inspection and Building Inspector's satisfaction.
- B. Where omissions or deficiencies are found, provide, repair or replace the firestopping so that it is complete and complies with requirements of tested and listed system design.

3.5 <u>Cleaning</u>

A. Clean off excess fill materials and sealants adjacent to openings and joints as work

progresses. Use methods and cleaning materials approved by manufacturers of firestopping products and/or assemblies in which openings and joints occur.

B. Protect firestopping during and after curing period from contact with contaminating substances. If damage is caused by others, Owner and General Contractor are to instruct Firestop Contractor to make appropriate repairs and charge to appropriate trades.

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

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 <u>Submittals</u>

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 <u>Sealant</u>

- 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 <u>Caulking</u>

- 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 Compressible Joint Sealant

Sealant shall be compressible polyurethane foam impregnated with polybutylene, Polytite as manufactured by Polytite Manufacturing Corporation, or other material as approved.

2.4 <u>Filler</u>

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.

2.5 <u>Accessories</u>

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.
- 3.3 <u>Clean-up</u>

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

HOLLOW METAL DOORS & FRAMES - SECTION 08110

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

Furnish and install all hollow metal doors and frames including view windows, as indicated on the drawings and herein specified.

1.2 <u>Submittals</u>

- 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 <u>Templates</u>

- 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 <u>Storage</u>
 - 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 20gauge 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 <u>continuously</u> welded and ground smooth. Bondo seams are not acceptable.
 - C. Doors and frames shall be equal to Steelcraft, Curries, Pioneer or approved equal.
 - D. Doors shall be coordinated with thresholds specified under <u>FINISH HARDWARE</u> <u>SECTION 08710</u> to meet A.D.A. requirements. Doors shall be extended as required to seal against threshold.
 - E. Non-full height doors such as Toilet Stall Doors shall be provided with an inverted

filler cap channel at head to maintain smooth uniformity at top of door surface.

- F. 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).
- G. Exterior door face sheets shall be galvannealed steel, level A60 (ASTM A653).
- H. Hardware preparation for hollow metal doors: hinge reinforcements shall be minimum 7-gauge x 9" length.
- I. Hardware Reinforcements:
 - 1. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].
 - 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.
- J. Glass moldings and stops (both labeled and non-labeled doors):
 - 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 nonlabeled doors: use the same trim.
 - 4) Acceptable mounting methods:
 - 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.
- K. 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.

- 1. 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 <u>continuously</u> 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, <u>including special reinforcing for extra</u> <u>heavy duty use</u>, 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. While in the shop and prior to shipping, all frames to be installed in masonry shall be thoroughly coated on the inside surface with a bituminous water resistant paint.
 - I. Electrical Requirements for Frames:
 - 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.
 - 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. <u>Accessibility</u>: Each component shall bear a label located to be accessible after installation.
- b. <u>Permanence</u>: 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. <u>Legibility</u>: 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. <u>Fire Resistance</u>: 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. <u>Other Requirements</u>: 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.

- Other Requirements As directed by the <u>approved</u> laboratory or organization providing testing and follow-up services and labeling.
- 2.4 <u>Finish</u>
 - 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. VERIFY THAT ALL FRAMES TO BE INSTALLED IN MASONRY HAVE BEEN COATED WITH A BITUMINOUS WATER RESISTANT PAINT IMMEDIATELY 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 <u>Protection</u>

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 <u>Related Documents</u>
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 <u>Section Includes</u>
 - 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 <u>Requirements Of Regulatory Agencies</u>
 - 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.
 - 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
 - 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) ULIOC 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 <u>Supplier Qualifications</u>
 - 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 <u>Submittals</u>

- 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 <u>Quality Assurance</u>

- 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.
 - 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 <u>Warranty</u>
 - 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 <u>Samples</u>
 - A. Sample Submittal
 - 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.
 - Protect all doors from exposure to direct sunlight and artificial light after delivery.
 - 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 <u>Coordination</u>

- 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 <u>Manufacturers</u>
 - 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 <u>Doors</u>
 - 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. 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.
- F. 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:
 - 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.
 - 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.

- 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.
- G. 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.
 - 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. 45minute 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:
 - 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 prefinish 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.
 - 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 <u>Protection</u>
 - 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

FIBERGLASS (FRP) DOORS AND FRAMES - SECTION 08220

<u>1.0 – GENERAL</u>

- 1.1 <u>Section Includes</u>
 - A. Fiberglass reinforced plastic (FRP) Doors
 - B. Fire-rated fiberglass reinforced plastic (FRP) Doors
- 1.2 <u>Related Sections</u>
 - A. Applicable provisions of Division 1 shall govern all work under this section.
 - B. Division 4 Section "Unit Masonry Assemblies" for installing anchors and grouting frames in masonry construction.
 - C. Division 8 Section "Door Hardware" for door hardware and weather-stripping.
 - D. Division 8 Section "Glazing" for glass in doors and frames.
 - E. Division 9 Section "Painting" for field painting factory-primed hollow metal doors and frames.
- 1.3 Quality Assurance
 - A. General: Provide fiberglass reinforced door and frame units made of components of standard construction furnished by one manufacturer as coordinated assemblies.
 - B. Manufacturer: Company specializing in the manufacture of fiberglass doors and frames with a minimum of fifteen years documented experience.
 - C. Construction: Verify that FRP doors and frames are manufactured utilizing pultruded fiberglass components for durability, superior strength, and chemical resistance. Press-molded doors and frames will not be accepted.
 - D. Resins: Resins shall comply with USDA standards for incidental food contact.
 - E. Fire-rated doors and frames to conform to NFPA 252 (2008), CAN4 S104 (1985), UL10C (2001), and UL9 (2005).
 - F. Hardware Reinforcements: FRP doors and frames fabricated with a minimum screw holding strength to exceed WDMA extra heavy duty requirements.
 - G. Paint Adhesion: Coating for FRP doors, panels and frames to conform to AAMA 624-07 for color uniformity, film adhesion, specular gloss, direct impact, abrasion resistance, chemical resistance and USDA approved.
 - H. Warranty: Warranty fiberglass doors and frames for life of the initial installation against failure due to corrosion. Additionally, warranty fiberglass doors and frames for a period of 10 years against failure due to materials and workmanship from date of <u>substantial</u> <u>completion</u>.
- 1.4 <u>Submittals</u>
 - A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details and finishes.
- 1.5 Delivery, Storage And Handling
 - A. Deliver doors and frames palletized and / or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
 - B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and

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FIBERGLASS (FRP) DOORS AND FRAMES - SECTION 08220

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 - B. Inspect doors and frames on delivery for damage and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and

replace damage items that cannot be repaired as directed.

C. Store doors and frames in accordance with HMMA 840 standards.

2.0 - PRODUCTS

- 2.1 <u>Manufacturers</u>
 - A. Manufacturers: Subject to compliance with requirements, provide products by the following: Basis of Design Edgewater Door
 - 1. Oshkosh Door -Pre-approved manufacturer
 - B. Exterior Doors and High Traffic Areas: Provide seamless doors complying with requirements indicated below:
 - 1. EP Series (Extra Heavy Duty)
 - 2. Doors to have internal full height solid polymer stiffeners 6 inches on center for superior strength.
 - 3. Lite openings shall be completely sealed utilizing solid polymer, integrated into the sub-frame during construction.
 - Core types: Please select one:
 - a. EPS Expanded polystyrene solid foam core, minimum 3# density. (standard)
 - b. EPP Optional polyurethane core (insulated)
 - c. EPB Optional balsa core (impact resistance)
 - d. EPH Optional honeycomb core (crush resistance)
 - C. Transom/side Panels: Transoms to be identical to the doors in construction and materials if applicable to this project.
- 2.2 <u>Fabrication</u>
 - A. General: Fabricate fiberglass door and frame units to be rigid, neat in appearance and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site.
 - B. Core Construction: Manufacturer's standard core construction that complies with the following:
 - 1. All voids to be fully filled with specified core material.
 - 2. All core components to be chemically bonded together prior to the application of FRP faces.
 - C. Framing System: Fabricate doors utilizing pultruded FRP tubes with minimum ¼" thick walls in combination with solid polymer members.
 - 1. All doors to be fully sealed on all 6 sides against water penetration to the core.
 - D. Door Faces: Laminated composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive and then cured under pressure until completely bonded.
 - E. Face Sheets: Please select one:
 - 1. Faces to be .090 smooth (standard)
 - 2. Faces to be .120 smooth (optional)
 - 3. Faces to be .090 pebbled (optional)
 - 4. Faces to be .120 pebbled (optional)
 - F. Clearances: Not more than 1/8 inch (3.2 mm) at jambs, heads, and wide side joint between meeting pairs.
 - G. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub free operation.

Square lock-edge will not be accepted.

- H. Tolerances: Maximum diagonal distortion 1/8 inch measured with straight edge, corner-to-corner.
- I. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium solid polymer and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.
- J. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.
- K. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies.
- L. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.
- M. Frame Construction: Fabricate frames to size and shape shown on drawings. Please select one:
 - 1. Knock-Down (KD): Fabricate frames for field assembly. Include stainless steel screws and 2"x2" corner brackets.
 - Set-up and resin welded: Fabricate frames with mitered resin-welded corners and seamless face joints. Assembled frames must include temporary spreader bars.
- N. Hardware Locations: Locate hardware as indicated on shop drawings or, if not indicated, according to manufacturer's standard locations.
- O. Glazing/Louver Stops: Manufacturer's standard two-piece PVC retainers.
 - 1. Provide non-removable stops on outside of exterior and on secure side of interior doors for glass, louver and other panels in doors.
 - 2. Provide screw-applied, removable, glazing stops on inside of glass, louvers and other panels in doors.
 - 3. Loose, eight-piece trim kits will not be accepted. Additionally, retainers held in place by two-sided tape are not acceptable.
 - 4. Glass to be supplied and installed under section 08800, unless stated otherwise.
- P. Astragals: 3/16" x 1" solid FRP flat plate for attachment to the inactive leaf.
- 2.3 <u>Finishes</u>
 - A. Prime Finish: Pre-clean and shop prime each door and frame ready for finish painting, performed at the jobsite under Section 09900.
 - B. Factory Finished: Where indicated, furnish fiberglass doors and frames factory pre-finished.
 - 1. Finish: Manufacturers standard chemical resistant acrylic polyurethane topcoat
 - 2. Sheen: Semi-gloss
 - 3. Pencil Hardness, ASTM D3363 3H
 - 4. Pigmented gelcoats will not be accepted as a final factory finish.
 - C. Finish on fiberglass frames must match that of the fiberglass doors to which they are installed.
- 2.4 <u>Hardware</u>
 - A. Hardware: All hardware shall be furnished under section 08710 unless stated otherwise.

<u>3.0 – EXECUTION</u>

3.1 <u>Installation</u>

- A. General: Install fiberglass doors, frames and accessories according to Shop Drawings, manufacturer's data and as specified.
- B. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- C. Door Installation: Fit fiberglass doors accurately in hollow metal frames. Shim as necessary.
- 3.2 Adjusting And Cleaning
 - A. Cleaning: Clean fiberglass door and frame assemblies in accordance with manufacturer's recommended procedure.

END OF SECTION
COILING COUNTER DOORS - SECTION 08332

1.0 - GENERAL

- 1.1 <u>Section Includes</u>
 - A. Overhead Coiling Counter Doors, manually operated.
- 1.2 <u>Related Sections</u>
 - A. Section 05500 Metal Fabrications: Support framing and framed opening.
 - B. Section 08710 Door Hardware: Product Requirements for cylinder core and keys.
 - C. Section 09900 Painting: Factory applied finish.
 - D Division 16 -
 - 1. Raceway and Boxes: Conduit from electric circuit to door operator and from door operator to control station.
 - 2. Wiring Connections: Power to disconnect.
- 1.3 <u>References</u>
 - A. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - B. ASTM A 666 Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - C. ASTM A 924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - D. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - E. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 - F. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
 - G. NEMA ICS 2 Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
- 1.4 <u>Submittals</u>
 - A. Submit under provisions of Section 01300.
 - B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Details of construction and fabrication.
 - 4. Installation methods.

- C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 Quality Assurance

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Install in areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship and installation is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.
- 1.6 Delivery, Storage, And Handling
 - A. Store products in manufacturer's unopened packaging until ready for installation.
 - B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
 - C. Store materials in a dry, warm, ventilated weathertight location.

1.7 Project Conditions

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 <u>Coordination</u>

- A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.
- 1.9 <u>Warranty</u>
 - A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.

- B. Manufacturer's 2 year limited warranty for PowderGuard Premium Powder Coat Finish.
- C. Manufacturer's 4 year limited warranty for PowderGuard Zinc Powder Coat Finish.
- D. Manufacturer's 5 year limited warranty for PowderGuard Weathered Powder Coat Finish applied to complete door system.

2.0 - PRODUCTS

2.1 <u>Manufacturers</u>

- A. Basis of Design is: Overhead Door Corporation., Similar counter doors manufactured by Kinnear/Cookson/Cornell are also pre-approved.
 - B. Requests for other substitutions will be considered in accordance with provisions of Section 01360.

2.2 Overhead Coiling Steel Counter Doors

- A. Galvanized Steel Counter Doors: Overhead Door Corporation, 650 Series.
 - 1. Wall Mounting Condition: Between Jambs Mounting
- B. Curtain: Interlocking slats, Type F-158 fabricated of 22 gauge galvanized steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
- C. Finish:

Slats and hood galvanized steel in accordance with ASTM A 653 with rustinhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester (powder coated) top coat.

- 1. Powder coat: PowderGuard (197 Colors) PowderGuard Premium: Weather resistant polyester powder coat color as selected by the Architect.
- 2. Non-galvanized exposed ferrous surfaces for guides, bottom bar and head plates shall receive one coat of rust-inhibitive primer.
- D. Bottom Bar:
 - 1. Single primed steel angle bottom bar with weatherstrip.
- E. Guides: Extruded aluminum.
 Finish: PowderGuard Weathered finish with iron/black powder.
 Finish: PowderGuard Zinc Finish for guides, bottom bar and head plate.
- F. Brackets: Steel plate to support counterbalance, curtain and hood. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
- G. Hood: Provided with intermediate support brackets as required and fabricated of:
 - 1. Galvanized primed steel.

- H. Operation:
 - 1. Manual push up.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
 - B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
 - C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
 - B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
 - B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
 - C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
 - D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
 - E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
 - F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
 - G. Install perimeter trim and closures.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
 - B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 <u>CLEANING</u>

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
 - B. Remove labels and visible markings.
 - C. Touch-up, repair or replace damaged products before Substantial Completion.
- 3.6 PROTECTION
- A. Protect installed products until completion of project.

END OF SECTION

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS - SECTION 08420

<u> 1.0 - GENERAL</u>

1.1 <u>Related Documents</u>

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

1.2 <u>Summary</u>

- A. Section Includes: Kawneer Aluminum Entrances and Storefronts, glass and glazing, hardware and components.
 - Type of Aluminum Entrance: 500 Swing Door; Wide stile, 5" (127 mm) vertical face dimension, 1-3/4" (44.5 mm) depth, high traffic applications.
 - Type of Storefront: Thermal Barrier (Trifab® VG 451T): Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation
- B. Related Sections:
 - 1. Section 07910 "Joint Sealants" for joint sealants installed as part of the aluminum storefront system.
 - 2. Section 08710 Finish Hardware
 - 3. Section 08810 Glass and Glazing
- 1.3 Definitions
 - A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).
- 1.4 <u>Performance Requirements</u>
 - A. General Performance: Aluminum-framed entrance and storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - a. Basic Wind Speed (MPH): (120)
 - b. Importance Factor (I, II, III): (1.15)
 - c. Exposure Category B
 - B. Entrance System Performance Requirements:

- 1. Wind loads: Provide entrance system; include anchorage, capable of withstanding wind load design pressures based on the 2021 International Building Code.
- Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s · m2) at a static air pressure differential of 6.24 psf (300 Pa).
- 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
- 4. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
- 5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: .60 with SHGC not to exceed .25.
- 6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
 - a. Glass to Exterior 70 frame and 69 glass (low-e)
 - b. Glass to Center 62 frame and 68 glass (low-e)
 - c. Glass to Interior 56 frame and 67 glass (low-e)
- 7. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
 - a. Glass to Exterior 38 (STC) and 31 (OITC)
 - b. Glass to Center 37 (STC) and 30 (OITC)
 - c. Glass to Interior 38 (STC) and 30 (OITC)

1.5 <u>Submittals</u>

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frame storefront system indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum framed entrance system and components required.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.

- F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminumframed systems, made from 12" (300 mm) lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- G. Other Action Submittals:
 - 1. Entrance Door Hardware Schedule: See Section 08710. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 Quality Assurance

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
- F. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- G. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 Project Conditions

A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 <u>Warranty</u>

- A. Manufactures Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

2.0 - PRODUCTS

- 2.1 <u>Manufacturers</u>
 - A. Basis-of-Design Product:
 - 1. Kawneer Company Inc.
 - 2. Trifab® 451T (thermal) Storefront System
 - 3. 2" x 4-1/2" (50.8 mm x 114.3 mm) System Dimensions
 - 4. Glass: Center, Exterior or Interior
 - B. Subject to compliance with requirements, provide a comparable product by the following:
 - 1. Manufacturer: YKK to meet or exceed the criteria specified.
 - C. Substitutions: Refer to Substitutions Section 01360 for procedures and submission requirements
 - 1. For pre-approval: Submit written requests ten (10) days prior to bid date.
 - Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years.
 - D. Substitution Acceptance: Acceptance will be in written form as an addendum or post bid documented by a formal change order signed by the Owner and Contractor and approved by Architect. No exceptions. No other substitutions will be considered post bid.

2.2 <u>Materials</u>

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be noncorrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chromeplated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
 - 1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 <u>Storefront Framing System</u>

- A. Thermal Barrier (Trifab® VG 451T):
 - 1. Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
 - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.
- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 <u>Glazing Systems</u>

- A. Glazing: As specified in Division 08810 Section "Glass and Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 a. Color: To be selected by Architect.
 - 2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Color: Matching structural sealant as selected by Architect.
- 2.5 Entrance Door Systems
 - A. Entrance Door Hardware: As specified in Division 08710 Section "Finish Hardware."

2.6 Accessory Materials

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

2.7 <u>Fabrication</u>

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing.
 - Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.

- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- 2.8 <u>Aluminum Finishes</u>
 - A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - B. Factory Finishing:
 - 1. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color to be selected by Architect.

3.0 - EXECUTION

- 3.1 <u>Examination</u>
 - 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 work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
 - 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
- B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 Field Quality Control

A. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 Adjusting, Cleaning, And Protection

- A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

1.0 - <u>GENERAL</u>

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 <u>Summary</u>
 - 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. Division 16: Electrical
 - 5. 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 <u>Submittals</u>
 - 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.
 - 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.
 - 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:
 - 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.
 - 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. Mortise Locks and Cylinders: Three Year Period
 - 2. Door Closers: Thirty Year Period
 - 3. Exit Devices: Three Year Period

1.8 <u>Maintenance</u>

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions that are packed in hardware items for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Parts kits: Furnish manufacturers' standard parts kits for locksets, exit devices, and door closers.

2.0 - PRODUCTS

- 2.1 Manufactured Units
 - A. Hinges:
 - 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.
 - For wood doors and frames install threaded-to-the-head wood screws.
 - For fire-rated wood doors install #12 x 1-1/4 inch, threaded-tothe-head steel wood screws.
 - 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.
 - Interior Doors: Non-rising pins.
 - 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:
 - Acceptable manufacturers:
 - a. Ives*
 - b. Select Products
 - c. Markar
 - 2. Characteristics:
 - 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 nonhanded and to be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
 - 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 ³/₄" 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 L9000 Series*
 - b. Sargent 8200 Series
 - c. Accurate 9000 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: Schlage L Series:
 - 1) Field Verify and Match Campus Standard.
 - i. Certifications:
 - 1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
 - 2) ANSI/ASTM F476-84 Grade 30 UL Listed.
- E. Deadbolts: as scheduled.
 - Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4" dia. steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike with 1/8" thick strike reinforcement and two 3" long screws. ANSI A156.5, 1992 Grade 1 certified.
- F. Exit Devices:
 - 1. Acceptable manufacturers:
 - a. Von Duprin 98 Series*
 - b. Precision Apex 2100
 - 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 4010/4110/4020 Series*
 - b. Norton 9500 Series
 - c. Corbin Russwin DC8000
 - Characteristics:
 - 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.
- 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.
- I. 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. Door Bolts/Coordinators:
 - 1. Acceptable manufacturers:
 - a. Ives*
 - b. Trimco
 - c. Rockwood Manufacturing
 - 2. Characteristics:
 - Flush bolts to be forged brass 6-3/4" x 1", with 1/2" diameter bolts. Plunger to be supplied with milled surface one side that fits into a matching guide.
 - Automatic flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
 - c. Self-latching flush bolts to be UL listed as top and bottom bolts on a pair of classified fire doors. Bolt construction to be of rugged steel and brass components.
 - d. Automatic flush bolts and self-latching flush bolts to be UL listed for fire door application without bottom bolts (LBB).
 - e. Furnish dust proof bottom strikes.
 - f. Coordinator to be soffit mounted non-handed fully automatic UL listed coordinating device for sequential closing of paired doors with or without astragals.
 - g. Provide filler piece to close the header. Provide brackets as required for mounting of soffit applied hardware.
- K. Push Plates: 1. Acce

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- Acceptable manufacturers:
 - a. Ives*
 - b. Trimco
 - c. Rockwood Manufacturing
- 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.
- L. Door Pulls & Pull Plates:
 - 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.
- M. 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.

- N. 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 to be 10 inches in height.
 - 3) Mop plates to be 6 inches in height.
 - 4) Kick plates and Mop plates to be 1" less that bottom rail height where applicable.
 - 5) Armor plates to be 34 inches in height. Armor plates on fire doors to comply with NFPA 80.
- O. Thresholds: 1 Acce
 - Acceptable manufacturers:
 - a. Zero Weatherstripping Co., Inc.*
 - b. Pemko
 - c. Reese Industries
 - 2. Types: Indicated in Hardware Headings.
- P. Door Seals/Gasketing:
 - Acceptable manufacturers:
 - a. Zero Weatherstripping Co., Inc.*
 - b. Pemko
 - c. Reese Industries
 - 2. Types: Indicated in Hardware Headings.
- Q. Silencers:

1

- 1. Acceptable manufacturers:
 - a. lves*
 - b. Hager
 - c. Rockwood Manufacturing
- 2. Provide three for each single door; two for each pair of doors.
- R. Knox Box: (AS REQUIRED)
 - 1. Acceptable manufacturers:
 - 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 <u>Materials and Fabrication</u>
 - 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.
 - 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 Campus Standard**. All hardware to be 626 (US26D), 652 (US26D) Satin Chrome Finish, with the following exceptions:
 - 1. Continuous Hinges: 628 (US28) Clear Anodized Aluminum
 - 2. Door Closers: 689 Powder Coat Aluminum
 - 3. Push Plates: 630 (US32D) Satin Stainless Steel
 - 4. Pull Plates: 630 (US32D) Satin Stainless Steel
 - 5. Protective Plates: 630 (US32D) Satin Stainless Steel
 - 6. Overhead Holders: 630 Satin Stainless Steel

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.
 - 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: A01

EACH	то	LAN/E-
EACH	10	HAVE:

1	CONT. HINGE	112XY	IVE
1	PANIC HARDWARE	CD-98-NL	VON
1	MORTISE CYLINDER	AS REQUIRED	
1	RIM CYLINDER	AS REQUIRED	
2	CYL/CORE	AS REQUIRED	
1	OH STOP	100S	GLY
1	SURFACE CLOSER	4021 MC TBWMS	LCN
1	MOUNTING PLATE	4020-18/18G SRT (AS REQ'D)	LCN
1	THRESHOLD	65A-223	ZER
COORDIN	ATE HARDWARE WITH ALUMINUM DOO	R/FRAME MANUFACTURER/SUPPLIER.	
BALANCE	OF HARDWARE BY ALUMINUM DOOR/F	RAME MANUFACTURER/SUPPLIER.	

HARDWARE SET: A02

EACH TO HAVE:

1	CONT. HINGE	112XY	IVE
1	PANIC HARDWARE	CD-98-DT	VON
1	MORTISE CYLINDER	AS REQUIRED	
1	CYL/CORE	AS REQUIRED	
1	OH STOP	100S	GLY
1	SURFACE CLOSER	4021 MC TBWMS	LCN
1	MOUNTING PLATE	4020-18/18G SRT (AS REQ'D)	LCN
1	THRESHOLD	65A-223	ZER
COORDI	NATE HARDWARE WITH ALUMINU	M DOOR/FRAME MANUFACTURER/SUPPLIER	

BALANCE OF HARDWARE BY ALUMINUM DOOR/FRAME MANUFACTURER/SUPPLIER.

HARDWARE SET: B01

EACH -	TO HAVE:		
6	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	REMOVABLE MULLION	KR4954	VON
1	PANIC HARDWARE	CD-98-DT-SNB	VON
1	PANIC HARDWARE	CD-98-NL-SNB	VON
3	MORTISE CYLINDER	AS REQUIRED	
1	RIM CYLINDER	AS REQUIRED	
4	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4111 SCUSH MC TBWMS	LCN
2	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER
1	RAIN DRIP	142AA (AS REQ'D)	ZER
2	MEETING STILE	328AA-S (PAIR)	ZER
1	GASKETING	8144SBK PSA	ZER
2	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A-223	ZER

HARDWARE SET: B02

EACH	TO HAVE:		
3	HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
1	PANIC HARDWARE	CD-98-NL-SNB	VON
1	MORTISE CYLINDER	AS REQUIRED	
1	RIM CYLINDER	AS REQUIRED	
2	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SHCUSH MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	RAIN DRIP	142AA (AS REQ'D)	ZER
1	MEETING STILE	328AA-S (PAIR)	ZER
1	GASKETING	8144SBK PSA	ZER
1	DOOR SWEEP	8198AA	ZER
1	THRESHOLD	65A-223	ZER

HARDWARE SET: B03

HAVE:		
HINGE	5BB1HW 4.5 X 4.5 NRP 630	IVE
REMOVABLE MULLION	KR4954	VON
PANIC HARDWARE	22-EO-230EO	VON
PANIC HARDWARE	22-NL-230NL	VON
RIM CYLINDER	AS REQUIRED	
CYL/CORE	AS REQUIRED	
SURFACE CLOSER	1461 SCUSH MC TBWMS	LCN
MULLION SEAL	139N PSA	ZER
RAIN DRIP	142AA (AS REQ'D)	ZER
MEETING STILE	328AA-S (PAIR)	ZER
GASKETING	8144SBK PSA	ZER
DOOR SWEEP	8198AA	ZER
THRESHOLD	65A-223	ZER
	HAVE: HINGE REMOVABLE MULLION PANIC HARDWARE PANIC HARDWARE RIM CYLINDER CYL/CORE SURFACE CLOSER MULLION SEAL RAIN DRIP MEETING STILE GASKETING DOOR SWEEP THRESHOLD	HAVE:HINGE5BB1HW 4.5 X 4.5 NRP 630REMOVABLE MULLIONKR4954PANIC HARDWARE22-EO-230EOPANIC HARDWARE22-NL-230NLRIM CYLINDERAS REQUIREDCYL/COREAS REQUIREDSURFACE CLOSER1461 SCUSH MC TBWMSMULLION SEAL139N PSARAIN DRIP142AA (AS REQ'D)MEETING STILE328AA-S (PAIR)GASKETING8144SBK PSADOOR SWEEP8198AATHRESHOLD65A-223

HARDWARE SET: C01

EACH TO	HAVE:		
3	HINGE	5BB1HW 4.5 X 4.5 NRP	IVE
1	PANIC HARDWARE	CD-98-NL-SNB	VON
1	MORTISE CYLINDER	AS REQUIRED	
1	RIM CYLINDER	AS REQUIRED	
2	CYL/CORE	AS REQUIRED	
1	SURFACE CLOSER	4111 SHCUSH MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE

HARDWARE SET: C02

EACH TO HAVE:

6	HINGE	5BB1HW 4.5 X 4.5 NRP	IVE
1	REMOVABLE MULLION	KR4954	VON
1	PANIC HARDWARE	CD-98-DT-SNB	VON
1	PANIC HARDWARE	CD-98-NL-SNB	VON
3	MORTISE CYLINDER	AS REQUIRED	
1	RIM CYLINDER	AS REQUIRED	
4	CYL/CORE	AS REQUIRED	
2	SURFACE CLOSER	4111 SHCUSH MC TBWMS	LCN
2	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MULLION SEAL	139N PSA	ZER

HARDWARE SET: C03

IVE
VON
LCN
IVE

HARDWARE SET: D01

EACH	TO HAVE:		
3	HINGE	5BB1HW 4.5 X 4.5	IVE
1	PUSH PLATE	8200 4" X 16"	IVE
1	PULL PLATE	8303 10" 4 " X 16"	IVE
1	SURFACE CLOSER	4111 EDA MC TBWMS	LCN
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: D02

HAVE:		
HINGE	5BB1HW 5 X 5	IVE
CONST LATCHING BOLT	FB51P (HMD)	IVE
DUST PROOF STRIKE	DP1	IVE
CLASSROOM LOCK	L9070	SCH
CYL/CORE	AS REQUIRED	
ARMOR PLATE	8400 32" X 2" LDW B-CS	IVE
WALL STOP	WS401/402CVX	IVE
SILENCER	SR64	IVE
	HAVE: HINGE CONST LATCHING BOLT DUST PROOF STRIKE CLASSROOM LOCK CYL/CORE ARMOR PLATE WALL STOP SILENCER	HAVE: HINGE 5BB1HW 5 X 5 CONST LATCHING BOLT FB51P (HMD) DUST PROOF STRIKE DP1 CLASSROOM LOCK L9070 CYL/CORE AS REQUIRED ARMOR PLATE 8400 32" X 2" LDW B-CS WALL STOP WS401/402CVX SILENCER SR64

HARDWARE SET: D03

EACH TO	HAVE:		
3	HINGE	5BB1 4.5 X 4.5	IVE
1	OFFICE/ENTRY LOCK	L9050 L583-363	SCH
1	CYL/CORE	AS REQUIRED	
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: D04

EACH	TO HAVE:		
3	HINGE	5BB1 4.5 X 4.5	IVE
1	CLASSROOM LOCK	L9070	SCH
1	CYL/CORE	AS REQUIRED	
1	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	MOP PLATE	8400 6" X 1" LDW B-CS	IVE
1	WALL STOP	WS401/402CVX	IVE

HARDWARE SET: D05

ALL HARDWARE BY OVERHEAD/COILING DOOR MANUFACTURER/SUPPLIER.

END OF SECTION

Job No. 22-131

<u> 1.0 - GENERAL</u>

- 1.1 <u>Scope</u> 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.
 - C. Warranty for Insulating Glass: Manufacturer's standard form, signed by insulatingglass 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

Job No. 22-131

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. 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

3.0 - EXECUTION

3.1 <u>Preparation</u>

- 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

GYPSUM DRYWALL & LIGHT GAUGE METAL STUD SYSTEM - SECTION 09260

<u> 1.0 - GENERAL</u>

- 1.1 <u>Scope</u> 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 <u>Submittals</u>
 - 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 <u>Delivery and Storage</u> 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 <u>Materials</u>
 - A. <u>Interior wall metal studs</u> 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. <u>Exterior wall metal studs</u> 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.

 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.

- 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 <u>Auxiliary Materials</u>

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. <u>All walls shall extend to underside of deck above.</u>
 - 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° 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. <u>Vertical Furring</u> All vertical furring in ceiling shall be of 5/8" fire rated gypsum board on metal framing. <u>DO NOT</u> furr with acoustical panels.
- 3.2 Drywall Finish
 - A. <u>Temperature and Humidity Conditions</u> 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. <u>Finish exposed drywall surfaces</u> 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. <u>Use joint tape</u> 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.

<u>Securely fasten metal corner beads</u> as recommended by the manufacturer. Do not use fasteners which cannot be fully concealed by joint compound fill applied over flanges.

E. <u>Edge Trimming</u> 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. <u>Application of Joint Compounds</u>

Use only compatible compounds from one manufacturer. After mixing, do not use joint compounds if recommended pot-life time has expired. <u>Allow drying time</u> 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. <u>Apply not less than 3 separate coats of joint compound</u> 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. <u>LEVELS OF FINISH</u>. 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 3:

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. One additional coat of joint compound shall be applied over all joints and interior angles. Fastener heads and accessories shall be covered with two 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.

> Typically specified in appearance areas which are to receive heavy- or medium-texture (spray or hand applied) finishes before final painting, or where heavy-grade wallcoverings are to be applied as the final decoration. This level of finish is not recommended where smooth painted surfaces or light to medium wallcoverings are specified.

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 <u>Summary</u> A. Se
 - 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:
 - 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 <u>References</u> A. Ame
 - American Society for Testing and Materials (ASTM):
 - 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.

- ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- 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 <u>Submittals</u>

- 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

- 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.

<u>HumiGuard Plus Ceilings</u>: 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.
 - Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

2.0 - PRODUCTS

- 2.1 <u>Manufacturers</u>
 - A. <u>Ceiling Panels</u>: Armstrong World Industries, Inc. USG or pre-approved equal.
- 2.2 Acoustical Ceiling Units
 - A. <u>Acoustical Panels Type L1 (without fire guard)</u>: Product: Fine Fissured, 1728
 - 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 15/16" Exposed Tee.
 - Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
 - Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
 - 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;
 - 10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.
 - 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.
 - Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.
 - Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
 - 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.
 - 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.
 - 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 (WITHOUT FIRE GUARD CEILING TILES)

- A. Components: All main beams and cross tees shall be commercial quality hotdipped 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.
 - Acceptable Product: Prelude XL 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, prestretched, 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 hotdipped 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, prestretched, 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 <u>Examination of Adjoining Work</u> 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.

PART 1 - GENERAL

1.1 <u>Description</u>

- A. Scope
 - 1. The complete installation of modular sports surfacing system including the interlocking suspended high-impact polypropylene copolymer tile of proprietary formulation, supportive acoustical underlayment and striping.
- B. Related work specified under other sections.
 - 1. Concrete Subfloors Section 03300
 - a. The general contractor shall furnish and install the concrete subfloors.
 - b. The slab shall be steel troweled to a medium-dense finish to a tolerance of ±1/8" (3.2mm) in any 10' (3m) radius. Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized. High spots shall be ground level and low spots filled with approved leveling compound.
 - 2. Game Standard Inserts Section 11662

1.2 <u>References</u>

- A. ASTM (American Society for Testing & Materials)
 - 1. ASTM D 256
 - 2. ASTM D 638
 - 3. ASTM D 648
 - 4. ASTM D 785
 - 5. ASTM D 792
 - 6. ASTM C 1028
 - 7. ASTM G 21

B. ISO (International Organization for Standardization)

- 1. ISO 1183
- 2. ISO 527-1, -2
- 3. ISO 179
- 4. ISO 180
- 5. ISO 75B-1, -2

1.3 <u>Submittals</u>

- A. Sport Court Response HG Specifications.
- B. One sample of specified system.
- C. Sport Court Modular Sports Flooring Installation Guide.
- D. Sport Court Modular Sports Flooring Care and Maintenance Guide.
- E. Sport Court Response HG Warranty.
- 1.4 Quality Assurance
 - A. Material Supplier:
 - 1. Shall be Sport Court International, Inc. or pre-approved equal.
 - 2. Manufacturer must be ISO 9001:2008 and ISO 14001:2004 Certified to assure proper quality and environmental control.
 - 3. Manufacturer shall be a Zero Waste company.

- 4. Manufacturer shall have produces sports surfaces for a longer time period than their stated warranty.
- 5. Surfaces must be certified for competition by the international federations for basketball (FIBA), volleyball (FIVB), handball (IHF) and badminton (BWF).
- 6. Product must have factory applied urethane coating.
- B. Installer:
 - 1. The complete installation of the flooring system, as described in these specifications, shall becarried out by an experienced installer (Flooring Contractor), and the work shall be performed in accordance with current installation instructions of Sport Court, International.
 - 2. Installer (Flooring Contractor) shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.
 - 3. Successful bidder must submit a minimum of five (5) completed modular projects of similar magnitude and complexity within the last two (2) years.
 - 4. Bidder must provide all sample tile, accessory products, and documentation.

1.5 Delivery, Storage And Handling

- A. Materials must be delivered in manufacturer's original, unopened and undamaged packaging with identification labels intact.
- B. Store material on a clean, dry, and flat surface, protected from exposure to harmful weather conditions or possible damage.
- C. Storage conditions shall be 55°F to 80°F (13°C to 27°C).

1.6 <u>Site Conditions</u>

- A. In order to prevent damage and not void the warranty, installation of modular materials shall not commence until all other finishes and overhead mechanical trades have completed their work in the modular floor areas.
- B. Permanent heat, light and ventilation shall be installed and operating during and after installation.
- C. Subfloors shall be clean, dry and free from dirt, dust, oil, grease, paint, old adhesive residue, or other foreign materials.
- D. Flooring installation shall not begin until the levelness requirements of concrete subfloors have been met.
- E. The installation area shall be closed to all traffic and activity for a period to be set by the flooring contractor.
- F. Product shall be conditioned at temperatures between 55°F to 80°F (13°C to 27°C) and shall be maintained for 72 hours prior to, during, and 72 hours after installation.
- G. Environmental Limitations
 - 1. Comply with the Sport Court requirements.
 - 2. Adhere to all MSDS requirements for materials employed in the work.
 - 3. Protect all persons from exposure to hazardous materials at all times.
- H. After modular floors are installed and the game lines painted, the area is to be closed to allow curing time for the system, typically 3-5 days. No other trades or personnel are allowed on the floor until it has been accepted by the owner.

1.7 <u>Warranty</u> A. S

- Sport Court provides a limited warranty of fifteen (15) years on the materials it has supplied. (A copy of the full warranty, with its Terms and Exclusions, is available from the authorized Sport Court Dealer.) This 15-Year Limited Warranty is subject to the Response HG Flooring Warranty and all of their provisions. This warranty is expressly limited to the flooring materials (goods) supplied by Sport Court. During the period covered under this Response HG Flooring Warranty, Sport Court shall repair/replace any tile(s) with a defective Response HG Flooring with the same or substantially similar product according to the schedule in the Response HG Flooring Warranty. To maintain your fifteen (15) year limited warranty, an "HG Maintenance Coat" must be applied by a certified Agent within the first three (3) years after installation of the new floor and again during each subsequent three (3) year period thereafter. Application of the maintenance coat, in accordance with Sport Court's published guidelines per Response HG Maintenance Coat Program, is required to maintain warranty coverage of the Response HG Products. If the Response HG Maintenance Coat Program has not been followed, then this limited warranty coverage for HG Products is for a period of three (3) years from the date of installation, and all subsequent warranty coverage is voided. This warranty does not cover floor damage caused (wholly or in part) by fire, winds, floods, moisture, other unfavorable atmospheric conditions or chemical action, nor does it apply to damage caused by ordinary wear, misuse, abuse, negligent or intentional misconduct, aging, faulty building construction, concrete slab separation, faulty or unsuitable subsurface or site preparation, settlement of the building walls or faulty or unprofessional installation of Sport Court flooring systems.
- B. Sport Court shall not be liable for incidental or consequential losses, damages or expenses directly or indirectly arising from the sale, handling or use of the materials (goods) or from any other cause relating thereto, and their liability hereunder in any case is expressly limited to the replacement of materials (goods) not complying with this agreement or, at their election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such materials (goods), whether such claims are for breach of warranty or negligence. Any claim shall be deemed waived by buyer unless submitted to Sport Court in writing within 30 days from the date buyer discovered, or should have discovered, any claimed breach.

PART 2 - PRODUCTS

2.1 Materials

- A. Sport Court Response HG[™] Patented Suspended Flooring shall be:
 - 1. Solid-top design.
 - 2. Metric-sized: 25cm x 25cm x 12.7mm (9.842" x 9.842" x 1/2").
 - 3. High-impact polypropylene copolymer suspended modules.
 - 4. 281 individual hexagonal cell support structure.
 - 5. Proprietary Maple or solid color in-mold foil transfer, with a four layer factory applied, wear resistant polyurethane clear coat.
 - 6. The tile shall have a patented positive locking system.
 - B. Standard Colors: Maple Select, Dark Maple, Pearl Burgundy, Pearl Navy Blue, Royal Blue, Ultra Red, Pearl Evergreen, Black, Silver
 - C. Color Consistency: E CMC < 1.0
 - D. Weight: 0.62 lbs. (280 grams)
 - E. Packaging: Product is shipped in pre-assembled sheets (2x4 modules per sheet, 6 sheets per box).
 - F. Material Test Results:

1.	Rockwell hardness:	(ASTM D 785)	65 R
2.	Heat deflection:	(ASTM D 648 @ 66 psi)	85°C

- (ISO 75B-1, -2 @ 40.45 MPa): 73°C Unannealed 3. Tensile Yield Strength: (ASTM D 638) 3,000psi (ISO 527-1, -2) 20 MPa 5% 4. Elongation at Yield: (ASTM D 638) (ISO 527-1, -2) 5% 5. Notched Izod: (ASTM D 256) No break at 23°C (ISO 180) 31kJ/m² 26kJ/m² Charpy Notched Impact: (ISO 179 @ 23°C) 0.902 specific gravity 23/23°C 7. Density: (ASTM D 792) (ISO 1183 @ 23°C) 0.90 g/cm Product Test Results:
- G.
 - 1. Friction: (ASTM C1028) Dry: 0.60 2. Flatness: 0.0" +0.029" /-0.0" (0.0mm +0.74mm /-0.0mm) 3. Lateral Forgiveness[™]: +0.045" / -0.0" (+1.14mm / -0.0mm)

H. L oad Bearing Capacity: 200 psi (1.38 MPa)

- L Underlayment
 - 1. Multi-purpose recycled rubber underlayment
 - 2. Thickness: 0.06" (1.5mm)
 - Density: 60 lbs. cu. ft. (961 ka/m³) 3.
 - Durometer: 60 ±5 on the Shore M or Shore A scales. 4
- J. Sanitary Information
 - Resistance to fungi (when tested in compliance with ASTM G-21 and MIL standard 1. 810-D procedure 508.3), All basic organisms tested (ATCC #6205-11797) and were found to have zero growth.
 - 2. Resistance to the following:
 - Bacteria and mildew resistance a.
 - Gram-positive bacterial Staphylococcus Aureus b.
 - Gram-negative Klebsiella Pneumoniae C.
 - d. Pink-staining organism
 - STV Reticulum e.
 - Surface fungi growth prior to and following leaching f.
- K. Game Line Paint
 - Adhesion Promoter: A s recommended and supplied by Manufacturer. 1.
 - Paint: aliphatic polyurethane as supplied by Sport Court. Custom colors to be available 2. upon Architect's request.
- L. Bleacher Blocking

Blocking tile system must be used in areas where bleachers shall be stored or rolled onto suspended flooring system. This system must be integrally designed to be used with flooring tiles and helps to create a solid tile configuration for reinforcement of weight distribution. Blocking tile system must be manufactured by same flooring manufacturer being bid.

PART 3 - EXECUTION

- 3.1 Inspection
 - Inspect concrete slab for contamination, dryness and levelness. Report any discrepancies to Α. the general contractor.
 - Concrete slab shall be broom cleaned, mopped and dust free by the general contractor. Β.
 - Installer (Flooring Contractor) shall document all working conditions as specified in PART C. 1 - GENERAL prior to starting installation. Report any discrepancies to general contractor.

3.2 Installation

- A. Underlayment Rubber underlayment shall be unrolled and allowed to relax. All butt joints shall be properly trimmed, fitted, and seamed together with an approved all-purpose tape.
- B. Floor shall be installed to pre-approved layout.
- C. Minimum clearance at all vertical obstructions of 3/4 inch (19mm) is required. D. Floor surface shall be clean and dust free.
- E. Game Lines
 - 1. Use only high quality masking tape approved by Sport Court.
 - 2. Lines shall be primed and painted using Sport Court proprietary adhesion promoter and recommended aliphatic polyurethane paint.
 - 3. Provide game lines as indicated on drawings.
 - 4. Room temperature shall be >55° F (13°C) and rising during paint installation.
 - F. Wall Base Install cove base anchored to walls with base cement
- G. Remove all excess and waste materials from the area of work. Dispose of empty containers in accordance with federal and local statutes.

3.3 Maintenance

- A. Extra Materials: Deliver extra material to Owner. Furnish extra material described below that match products installed packaged with protective covering for storage and identified with appropriate labels.
 - 1. 5% of main court color.
 - 2. 3% of all other colors.

RESILIENT TILE FLOORING - SECTION 09650

1.0 - GENERAL

- 1.1 <u>Section Includes</u>
 - A. Flooring and accessories as shown on the drawings and schedules as required for complete installation.
- 1.2 <u>Submittals</u>
 - A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions for flooring and accessories.
 - B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.
 - C. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.
 - D. See Section 01350 Submittals.
- 1.3 Quality Assurance and Regulatory Requirements
 - A. Installer Qualifications: Firm with minimum five years successful experience completing resilient tile installation similar to that required.
 - B. Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
 - C. Materials within each area shall be from one production run as indicated by cartons bearing the same manufacturer's color code.
 - D. Materials shall be uniform in thickness and size with accurately cut edges. No seconds, off-goods, or remnants will be allowed.
 - E. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - 1. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.
 - ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
 - F. Pre-Installation Conference: Conduct meeting at site prior to commencing work related to resilient tile installation.
 - 1. Require attendance of parties directly affecting resilient tile installation.
 - 2. Review site conditions, procedures, and coordination required with related work.
- 1.4 Environmental Conditions
 - A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
 - B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.
 - C. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65°F (18°C) and a maximum temperature of 100°F (38°C) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55°F (13°C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.
 - D. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently

dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

2.0 - PRODUCTS

- 2.1 <u>Resilient Tile Flooring Materials</u>
 - A. Provide "Standard Excelon" Tile Flooring manufactured by Armstrong or preapproved equal, having a nominal total thickness of 1/8", 12 in. x 12 in. Color and pattern as selected by architect from manufacturer's full range of colors. Vinyl composition tile shall conform to the requirements of ASTM F 1066, Class 2 – through pattern.
 - B. Resilient tile patterns shall be indicated on architectural plans. Spacing and patterns shall be as indicated or directed.

2.2 <u>Adhesives</u>

- A. For Tile Installation System, Full Spread: Resilient Tile Adhesive under the tile and Wall Base Adhesive at the wall base shall be as manufactured or recommended by the manufacturer of the materials used. Provide epoxy adhesive at "wet" areas.
- 2.3 Accessories
 - A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), shall be as manufactured or recommended by the manufacturer of the products used.
 - B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
 - C. Provide transition/reducing strips tapered to meet abutting materials as shown on drawings.
 - D. Provide threshold of thickness and width as shown on the drawings.
 - E. Provide feature resilient edge strips, 1" wide x 24" length, of equal gauge to the flooring, homogeneous vinyl composition and color as selected by the Architect from standard colors available.
 - F. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.
 - G. Provide expansion joint cover equal to Construction Services GFST Series. Install per manufacturer's written instructions.
- 2.4 <u>Waterjet Floor Graphic</u>
 - A. Provide waterjet cut floor design. Size and location located on Architectural drawings. Graphic to be provided by Architect.
 - B. Cutting of VCT
 - 1. All cutting is to be done with waterjet technology.
 - 2. Tolerance between cuts is to be .002 (2/1000th of an inch).
 - 3. Waterjet cutting company is to be supplied an electronic file of the design.
 - 4. Includes cutting and assembly of the designs, and the field that surrounds.
 - C. Preparation for Shipping of VCT Tiles

- 1. Each design to be reassembled back into 12"x12"square.
- 2. Tiles to be faced tape with low tack tape.
- 3. Entire project to be checked for accuracy prior to boxing which includes verifying that each assembled piece fits correctly.
- 4. Tiles to be packed in a 14" x 14" box with foam surrounding VCT.
- 5. Each box to have labels indicating contents of box.
- 6. First box to be opened will be clearly marked.
- 7. Boxes to be palletized and shrink wrapped.
- 8. Waterjet cutting company will be available in case of emergency.
- 9. Installer to be notified in writing of the importance of having a smooth flat surface.
- 10. Shipment to be insured by shipper.
- D. Installation
 - 1. Installer to dry lay all waterjet designs prior to final installation.
 - 2. Installer to notify waterjet company of any concerns prior to final installation.
- 2.5 <u>Warranty</u>
 - A. Flooring materials under this section shall be warranted against manufacturing defects for five years from date of substantial completion.
 - B. Installation shall be warranted for two years from date of substantial completion. Installation warranty shall include guarantee that products have been installed according to manufacturer's installation instructions, edition which is current at the time of installation.
 - C. Prorated Manufacturer's Warranty
 - <u>Within One Year</u>: If a defect is reported in writing to the manufacturer within one year of final completion, manufacturer will supply new material of the same grade sufficient to repair or replace the defective material. Manufacturer will also pay for reasonable labor costs.
 - 2. <u>Within Two Years</u>: If a defect is reported in writing to the manufacturer after one year, but within two years of substantial completion, manufacturer will supply new material of same grade sufficient to repair or replace defective material. Manufacturer will also pay fifty per cent of reasonable labor costs.
 - 3. <u>After Two Years</u>: If a defect is reported in writing to the manufacturer after two years, but within five years of substantial completion, manufacturer will supply new material of same grade sufficient to repair or replace defective material.

3.0 - EXECUTION

- 3.1 Inspection
 - A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
 - B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
 - C. Report conditions contrary to contract requirements that would prevent a proper installation. **DO NOT** proceed with the installation until unsatisfactory conditions have been corrected.

- 3.2 Preparation
 - A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects as recommended by the flooring manufacturer.
 - B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
 - C. For Tile Installation System, Full Spread perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes", ASTM F 1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" or as required by manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80% and MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.
 - D. For Tile High-Moisture Installation Warranty, perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes", ASTM F 1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride", or required by manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 90% and MVER shall not exceed 7 lbs./1000 sq. ft./24 hrs. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.
 - E. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained
 - F. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.
- 3.3 Installation of Tile Flooring
 - A. Install flooring in strict accordance with the latest edition of Manufacturer's Guaranteed Installation System and recommended work practices from the Resilient Floor Covering Institute.
 - B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
 - C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.
 - D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
 - E. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.
 - F. Border pieces less than 6" wide are NOT acceptable.
 - G. Installation Direction: Quarter-turned unless otherwise indicated by Architect.

3.4 Installation of Accessories

- A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.
- B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.
- C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.
- D. Apply butt-type and/or overlap metal edge strips where shown on the drawings, before and/or after flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.
- 3.5 Cleaning and Protection
 - A. Immediately After Installation
 - 1. Sweep, Dust mop or vacuum the floor thoroughly to remove all loose dust and dirt.
 - 2. Remove any dried adhesive residue with a clean white cloth dampened with mineral spirits, carefully follow warnings on container.
 - 3. Damp mop the floor with a properly diluted neutral detergent solution as recommended by manufacturer.
 - 4. Apply high quality commercial floor sealer and Two (2) coats of high quality commercial floor polish as recommended by manufacturer. <u>DO NOT</u> wet wash, machine scrub or strip the floor for at least 4 to 5 days after installation. This is to prevent excess moisture from interfering with the adhesive bond and/ or seam treatments.
 - B. Preparation for Use
 - 1. Scrub the floor with a neutral detergent and scrubbing pad as recommended by manufacturer.
 - 2. Thoroughly rinse floor and allow to dry.
 - 3. Apply Three (3) additional coats of high-quality commercial floor polish as recommended by Manufacturer for a total of Five (5) coats for final acceptance.
 - C. Perform maintenance according to the latest edition of manufacturer's Guaranteed Installation System.
 - D. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

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 <u>Submittals</u>

- 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 Smoke Production	25 or less ASTM E-84. 350 or less ASTM E-84.
Floors	Flame Spread	75 or less ASTM E-84.
Manufacturers A. Rubber Base Mar	ufacturers	550 01 less A3 114 L-04.

- 1. Tarkett (Basis of Design)
- 2. Roppe

2.2

- 3. Flexco
- 4. Mannington
- B. Transition Material Manufacturers:
 - 1. Tarkett
 - 2. Roppe
 - 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. Adhesives, including primer, shall be as manufactured or recommended by the manufacturer of the materials used.
 - C. 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

- D. 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
 - 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

Α.

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
 - 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 <u>Cleaning and Waxing</u> Remove stains from base and clean as required and recommended by manufacturer.
- 3.6 <u>Surplus Materials</u> Unused runs and one full carton of materials shall be left at the job and turned over to the Owners.

1.0 – GENERAL

- 1.1 <u>Related Documents</u>
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 <u>Summary</u>
 - A. This section includes the following:
 - 1. Resinous flooring system as shown on the drawings and in schedules.
 - B. Related sections include the following:
 - 1. Cast-in-Place Concrete, Section 03300

1.3 <u>System Description</u>

- A. The work shall consist of preparation of the substrate, the furnishing and application of a seamless flooring system with decorative flake broadcast and chemical resistant topcoat.
- B. The system shall have the color and texture as specified by the Owner with a nominal thickness of 60 Mils. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
- C. 4 inch Cove base to be applied where noted on plans and per manufacturers standard details unless otherwise noted
- 1.4 Submittals
 - A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
 - B. Samples: A 6 x 6 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

1.5 Quality Assurance

- A. The Manufacturer shall have a minimum of 10 years' experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.
- B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in writing in all phases of surface preparation and application of the product specified. Qualifications of applicator must be submitted to Architect by the General Contractor for approval within 24 hours after acceptance of bid. Architect reserves the right to reject applicator if they do not meet the specified qualifications and/or cannot provide documentation from manufacturer.

- C. No requests for substitutions shall be considered that would change the generic type of the specified System.
- D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
- E. A pre-installation conference shall be held between Applicator, General Contractor, manufacturer and the Owner for review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.6 Product Delivery, Storage, And Handling

- A. Packing and Shipping All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.
- B. Storage and Protection
 - 1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
 - 2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Architect or other personnel.
- C. Waste Disposal
 - 1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.7 Project Conditions

- A. Site Requirements
 - 1. Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
 - The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
 - 3. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.
- B. Conditions of new concrete to be coated with specified flooring material.
 - 1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured for 28 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests. Outside of these parameters manufacturer shall be consulted.
 - 2. Concrete shall have a light steel trowel finish (a hard steel trowel finish is neither necessary or desirable).
 - 3. Sealers and curing agents should not be used.

- Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.
- C. Safety Requirements
 - 1. Other trades shall be removed during the application of the product and 72 hours after completion

2.0 - PRODUCTS

- 2.1 <u>Manufacturers</u>
 - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide <u>BPI Spartacote Chip Pure Seamless Floor System</u>. Not all manufacturers produce all categories and types of resinous systems.

flooring

- a. Also pre-approved are: Sherwin Williams – Aqua Armor Decorative Mosaic Flooring Stonhard – Stontec ERF
- 2. Other Products must be approved prior to Bid and must be submitted in compliance with Section 01360 Product Substitution.

2.2 Flooring

- A. Spartacote Chip Pure Seamless Floor System (60 mil floor system),
 - 1. System Materials:
 - a. Primer: Primer/Scratch Coat 160 sq. ft/gal
 - b. Base resin: Pigmented Body Coat 65 sq. ft/gal
 - c. Broadcast Aggregate: Broadcast Chips (size and quantity determined by selection of architect)
 - d. Grout Coat: MVT Tolerant UV Stable Glaze 160 sq. ft/gal
 - e. Top Coat: Surface Build Top Coat UV- Finish to be selected
 - by Architect
 - f. Color: See Finish Legend
 - 2. Cove base (4 inch high with 2 inch diameter radius, smooth texture)
 - a. Cove resin; Cove Gel, Spartacote Broadcast quartz mixed with resin and troweled in place
 - b. Overlay Spartacote Chip Pure Floor System to match floor
 - c. Cove termination strip: clear plastic with 1/8" lip

2.3 <u>Product Requirements</u>

Material: Spartacote Resin	2-component	
	ероху	
Density	12.70 lbs./gailon	
VOC Content, Mixed		
Volume Solids	59%	*******
Flash Point: Part A	>212°F	
Part B	170 °F	

Mixing Ratio	1:4 by Vol.
Pot Life, Approximate	60 minutes @ 75°F
Open to Foot Traffic	After 16 hrs. at 73°F
Curing Temperature	Minimum 50°F
Full Cure & Max. Resistance	7 days
Hardness, Shore D ASTM-D-2240	70-75
Compressive Strength ASTM-C- 579	6500 psi
Flexural Strength ASTM-C-580	2100 psi
Adhesion To:	110 psi
-New concrete (5 days)	550 psi
-Moist concrete (28 days) -Dry concrete (28 days)	580 psi

3.0 - EXECUTION

3.1 Examination

- A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
- B. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 Preparation

- A. General
 - 1. Existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products
 - 2. Mechanical surface preparation
 - a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-5 as described by the International Concrete Repair Institute.
 - b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
 - c. Wherever a free edge will occur, including doorways, wall perimeters, expansion joints, columns, doorways, drains and equipment pads, a ¼ inch deep by 3/16 inch wide keyways shall be cut in.
 - d. Cracks and joints (non-moving) greater than 1/4 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.

- 3. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.
- 3.3 Application
 - A. General
 - 1. The system shall be applied in six distinct steps as listed below:
 - a. Substrate preparation
 - b. Cove application
 - c. Primer Application
 - d. Topping/overlay application with flake aggregate broadcast.
 - e. Grout coat application
 - f. Topcoat application to thickness to reach even texture matching accepted sample
 - 2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
 - 3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
 - 4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
 - 5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.
 - B. Cove
 - Cove will be placed with the broadcast flake to match selected color and size at 4 inches in height unless otherwise noted on drawing with a 1 inch radius
 - 2. The cove will be smooth with no texture above mid-radius
 - C. Topping
 - 1. The topping shall be applied as a self-leveling system as specified. The primer must be applied and will not be a lift coat. The topping shall be applied in one to two lifts with a minimum thickness of 60 mils.
 - 2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
 - 3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means.
 - 4. The topping shall be applied over horizontal surfaces using a pin rake, trowels or other systems approved by the Manufacturer.
 - 5. Flake shall be broadcast into the wet material to excess.
 - Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
 - D. Grout coat and Topcoat
 - 1. The grout coat shall be mixed and applied per manufacturer recommended procedure.
 - 2. The grout coat shall be comprised of two components, a resin, hardener.
 - 3. The grout coat will be applied at the rate of 160 sf per gallon.
 - 4. The top coat shall be mixed and applied per manufacturer recommended procedure.
 - 5. The top coat shall be comprised of two components, a resin, hardener.
 - 6. The top coat will be applied at a rate to achieve selected texture.
 - 7. The finish floor will have a uniform texture free of dry or smooth areas that do not match the selected texture. The finished thickness shall be 60 mils.

3.4 Field Quality Control

A. Tests, Inspection

The following tests shall be conducted by the Applicator:

- 1. Temperature
- Air, substrate temperatures, relative humidity, and, if applicable, dew point.2. Perform moisture tests on concrete as follows:
 - a. Perform calcium chloride moisture tests in accordance with ASTM D1869 a minimum of twice for the first 1000 sq. ft and once for each additional 1000 sq. ft of area to be coated. Provide a written report of these test results including a letter of acceptance from the manufacturer.
 - b. Perform PH tests alongside each calcium chloride moisture tests. Provide a written report of these test results including a letter of acceptance from the manufacturer.
- B. Coverage Rates Rates for all layers shall be monitored by checking quantity of material used against the area covered.
- C. Provide daily reports including detailed days activities, materials used with batch numbers and environmental conditions
- 3.5 Cleaning And Protection
 - A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
 - B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

SECTION 09800 - ACOUSTICAL PANEL TREATMENT

1.0 <u>GENERAL</u>

1.1 <u>Section Includes</u>

- A. Acoustical wall panels.
- 1.2 Related Sections
 - A. Section 09260 Gypsum Board Assemblies.
 - B. Section 09510 Suspended Acoustical Ceilings: Conventional grid-supported acoustic ceilings.
 - C. Section 09910 Paints and Coatings.

1.3 <u>References</u>

- A. ASTM C 423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2000.
- B. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2000a.
- 1.4 Performance Requirements
 - A. Acoustical Absorption: Perform testing in accordance with ASTM C 423, Type A mounting method unless otherwise specified.
 - B. Flame Spread Rating: Provide all components with Class A flame spread rating when tested in accordance with ASTM E 84, unless otherwise specified.

1.5 <u>Submittals</u>

- A. Submit under provisions of Section 01350.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Independent testing agency test reports.
- C. Selection Samples: For each product specified, two complete sets of color samples representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- 1.6 <u>Quality Assurance</u>
 - A. Manufacturer Qualifications: Minimum 10 years of experience in producing acoustical products of the types specified herein.
 - B. Installer Qualifications: Acceptable to the manufacturer of the acoustical products being installed.

- C. Mock-Up: Provide a mock-up for evaluation of installed appearance.
 - 1. Install acoustical products in areas designated by Architect.
 - 2. Do not proceed with remaining work until Architect approves workmanship and appearance.
 - 3. Approved mock-up may remain as part of the work.
- 1.7 Delivery, Storage, And Handling
 - A. Protect acoustical products from moisture during shipment, storage, and handling.
 - B. Store products in manufacturer's unopened packaging until ready for installation.
 - 1. Store materials flat, in dry, well-ventilated space.
 - 2. Do not stand panels on end.
 - 3. Protect edges from damage.
 - C. Store and dispose of solvent-based materials, and materials used with solventbased materials, in accordance with requirements of local authorities having jurisdiction.

1.8 Project Conditions

- A. Do not begin installation of acoustical products until building has been enclosed and environmental conditions approximate those that will prevail when building is occupied.
- B. Environmental Requirements: Do not install panels until wet work, such as concrete and plastering, is complete; the building is enclosed; and the temperature and relative humidity are stabilized at 60 80 degrees F (16 27 degrees C) and 40% to 50%, respectively.

1.9 Extra Materials

A. Provide 5 percent, but not less than 1 of each type of acoustical unit actually installed, for Owner's use in maintenance.

2.0 <u>PRODUCTS</u>

- 2.1 <u>Manufacturers</u>
 - A. Basis of Design Manufacturer: G&S Acoustics
 - B. Requests for substitutions will be considered in accordance with provisions of Section 01360. Submit for pre-approval at least 10 days prior to bid.
 - C. Provide all acoustical products specified herein by a single manufacturer.
- 2.2 <u>Ceiling Products</u>
 - A. Acoustical Banners: Wrapped fiberglass batts of .75 to 1.65 pcf (12 to 26 kg/cu m).
 - 1. Core Thickness: 2 inches (51 mm); NRC .95. (Nylon)
 - 2. Size: As indicated.
 - 3. Finish Material: Manufacturer's standard perforated PVC sheet.
 - 4. Color: As selected from manufacturer's standards.

- 5. Edges: Natural
- 6. Mounting: Painted washers.
- 7. Mounting: Stiffeners wood/aluminum.

2.3 <u>Accessories</u>

- A. Painted Washers: Washers painted to match Banner color.
- B. Stiffeners: Wood/aluminum to match Banner finish.

3.0 EXECUTION

- 3.1 Examination
 - A. Do not begin installation until substrates have been properly prepared.
 - B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 <u>Preparation</u>

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 Installation

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Adhesive Mounting: Size back of panels at 18 inch (450 mm) on center in both directions with thin coating of adhesive in 4 inch (100 mm) squares. Center adhesive dabs the size of a large egg on each sized area, and press panel firmly against substrate, flattening adhesive. Block panel for not less than 24 hours until adhesive has set.
- C. Impaling Clips: Fasten clips to wall at 48 inches (1220 mm) on center, with points facing upward. Attach panels by pressing downward and toward the wall, so points of clips are embedded firmly in back of panel.
- D. Two-Part Clips: Fasten bars to wall at 48 inches (1220 mm) on center in both directions. Impale matching mechanical clips into back of panels in matching pattern and drop panel into position so clips fully engage into wall-mounted bars.

3.4 <u>Protection</u>

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
<u> 1.0 – GENERAL</u>

- 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 <u>Submittals</u>
 - 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 <u>Protection of Other Work</u>
 - 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 <u>Maintenance Material</u> 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 <u>Materials</u>
 - 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 <u>Colors</u> 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 <u>Accessory Materials</u> 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 <u>Schedule</u>
 - A. Exterior Metals
 - 1. Galvanized metal shall be solvent clean with VM&P Naphtha. Primer: S-W: Procryl B66 - 1310
 - Primer: S-W: Procryl B66 131
 - Finish: Apply two coats
 - B66-600 Series
 - 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
 - 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
 - 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 Wood

1

Exposed wood of every description.

Primer: S-W: Exterior Latex Wood Primer, B42W8041

- Finish: Apply Two Coats:
 - S-W: A-100 Exterior Latex Satin, A82 Series
- D. <u>Exterior Exposed Concrete and/or Clay Brick Masonry</u> 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

- E. Interior Concrete and Concrete Masonry
 - 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. <u>Concrete Sealer:</u> 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 $\frac{1}{4}$ " – $\frac{3}{8}$ " 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.

F. 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

G. <u>Stenciled Wall Identification</u>

Provide one coat red color stencil identification on walls above ceilings of corridor, Smokestop, Horizontal Exit, enclosures and Firewalls. Wording shall be:

- 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.
- 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.
- H. 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.
- I. <u>Glue-Lam Beam</u>
 - 1. Product: Minwax water based polyurethane.
 - 2. Surface Preparation Surface shall be clean, smooth and free of dust.
 - 3. Finish: Apply three (3) coats per manufacturer's written instructions.

J. <u>Exposed Ceiling Painting (Dryfall)</u> Primer: Pro Industrial Pro-Cryl Primer (1 coat) Finish: Waterborne Acrylic Dry Fall Flat (1-2 coats) B42W00001

3.3

- Material Application A. All materials shall be applied in complete accordance with manufacturer's printed instructions. Α.
- Β. All coats shall be thoroughly dry before the succeeding coat is applied.

SOLID PLASTIC TOILET COMPARTMENTS - SECTION 10212

<u> 1.0 - GENERAL</u>

1.1 <u>Summary</u>

- A. Section Includes: Solid plastic toilet compartments and urinal screens.
- B. Related Sections: Division 01: Administrative, procedural, and temporary work requirements.

1.2 <u>References</u>

- A. ASTM International (ASTM)
 - 1. A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 2. B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 System Description

- A. Compartment Configurations:
 - 1. Toilet partitions: Floor mounted, overhead braced.
 - 2. Urinal screens: Floor mounted.
- B. Solid Plastic Panels: Maximum flame spread/smoke developed rating of 75/450, tested to ASTM E84.
- 1.4 <u>Submittals</u>
 - A. Submittals for Review:
 - 1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
 - 2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.
 - 3. Samples: 3 x 3 inch samples showing available colors.

1.5 Quality Assurance

- A. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.
- B. Installer Qualifications: Minimum 5 years' experience in work of this Section.
- 1.6 Warranties

Provide manufacturer's 25-year warranty against breakage, corrosion, and delamination under normal conditions.

2.0 - PRODUCTS

2.1 <u>Manufacturers</u>

- A. Contract Documents are based on products by Scranton Products.
- B. Other Manufacturers wishing to submit product, must do so at least 10 days prior to bid and comply with Section 01360 Product Substitution.

2.2 <u>Materials</u>

- A. Doors, Panels and Pilasters:
 - 1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
 - 2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
 - 3. 1 inch thick with edges rounded to 1/4 inch radius.
 - 4. Color: To be selected by Architect from manufacturer's full color range.
- B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
- C. Stainless Steel: ASTM A167, Type 304.
- 2.3 <u>Hardware</u>
 - A. Hinges: Stealth integral hinge from door and pilaster material with exposed metal parts on interior of stall.
 - B. Door Strike and Keeper:
 - 1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
 - 2. Bumper: Extruded black vinyl.
 - C. Latch and Housing:
 - 1. Heavy-duty extruded aluminum.
 - 2. Latch housing: Bright dip anodized finish.
 - 3. Slide latch and paddle.
 - D. Coat Hook/Bumper:
 - 1. Combination type, chrome plated Zamak.
 - 2. Equip outswing handicapped doors with second door pull and door stop.
 - E. Door Pulls: Chrome plated Zamak.
- 2.4 Components
 - A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, with aluminum heat-sinc fastened to bottom edges.
 - B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.
 - C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

- D. Wall Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.
- E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.
- F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

3.0 - EXECUTION

- 3.1 Installation
 - A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.
 - B. Install rigid, straight, plumb, and level.
 - C. Locate bottom edge of doors and panels 14 inches above finished floor.
 - D. Provide uniform, maximum 3/8 inch vertical clearance at doors.
 - E. Not Acceptable: Evidence of cutting, drilling, or patching.
- 3.2 <u>Adjusting</u> Adjust doors and latches to operate correctly.

<u> 1.0 - GENERAL</u>

- 1.1 <u>Scope</u> The work required under this section consists of exterior Building Letters.
- 1.2 <u>Submittals</u>
 - A. Submit a sample drawing of letters, including size, style of lettering, materials, and finish and font.
- 1.3 Warranty

The letters shall have a lifetime warranty against fading, cracking, pitting or chipping as long as the letters are installed in their original location.

2.0 - PRODUCTS

- 2.1 <u>Metal Building Letters</u>
 - A. Each metal letter is precision cast in aluminum or bronze. Metal finishes and letter styles to be selected by the Architect.
 - B. See drawings for wording and location of letters. Font shall be subject to further selection by the Architect through the submittal process.
 - C. Size: Assume 36" high
 - D. The cast aluminum sign letters use virgin aluminum ingots Alloy 356 that are melted down in an all-electric, pollution free furnace. Aluminum Alloy 356 is a superior metal for outdoor signage because of its strength, hardness and corrosion resistance against weather extremes particularly in marine areas. This aluminum alloy has a tensile strength of 38,000 psi. finish to be selected by the Architect from the following two options:
 - 1. Anodized in the colors of clear, gold, medium bronze, dark bronze or black. The anodized aluminum letter shall use virgin ingots Alloy 514. Anodizing is an electro-chemical process which embeds the colored dye into the microscopic pores in the aluminum surface of the letter.
 - 2. Painted, select from 45 baked enamel colors.

3.0 - EXECUTION

3.1 Installation

Install per manufacturer's instructions and guidelines. Provide a mounting template for letter attachment.

3.2 <u>Maintenance</u> Routine maintenance of rinsing with mild soap and water usually will restore the metal surface to its original appearance.

IDENTIFYING DEVICES - SECTION 10426

1.0 - GENERAL

- 1.1 <u>Scope</u> The work required under this section consists of room/wall/ signs and building plaque(s).
- 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 <u>all existing signage types and styles</u> <u>currently installed</u> to provide a continuity of design to the owner as required.
- 1.3 <u>Submittals</u>
 - 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 mark-up 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 <u>Manufacturers</u>
 - 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

- 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 wall adjacent to latch side of door 60" from floor to centerline of signs and 2" from edge of door frame to edge of sign.
- I. Typical Signage Guidelines
 - 1. All Offices, Classrooms, and Instructional Areas shall be 6" x 8" with 2-1/2" x 8" changeable clear message insert.
 - 2. All other interior door signs except corridor and vestibule doors shall be 6" x 6" with no message strip.
 - 3. All restrooms to have minimum 6" x 8" sign with pictogram area with an additional area for raised copy and Braille.
 - 4. 6" x 6" tactile exit sign at all interior exit doors leading directly to the exterior with raised copy and Braille.
 - 5. Provide Exterior Signs (nominal 12" x 12") at all exterior entrances. Provide mounting as recommended by manufacturer. Exterior sign graphics to be provided by Architect.
 - Provide Framed Signage with Clear View Window. Frame to Match Interior Signage cover) to accommodate 8.5 x 11 Landscape Floor Plan. Provide two (2) per Classroom and Assembly Area.
- J. Occupant Load Sign to be provided at every Auditorium, Gymnasium, Cafeteria (Assembly Areas) as required by IBC Section 1004.3
- 2.3 <u>Pictorial Signs</u>
 - A. <u>Provide 12" x 18" baked enamel on metal sign with International Symbol for</u> <u>Accessibility Wheelchair and lettering "Physically Handicapped Parking Only."</u> 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 <u>Manual on Uniform Traffic Control Devices</u>.
- 2.4 Project Sign Specification requirements are listed in Section 01030.

3.0 - EXECUTION

- 3.1 <u>Installation of Signs</u> 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.

ROOF INFORMATION PLAQUE - SECTION 10428

1.0 -GENERAL

1.1 <u>Scope</u>

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 <u>Submittals</u>

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. Metal Building Roof

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
 - 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.

1.0 - GENERAL

1.1 <u>Scope</u>

The work of this section shall include all labor, material, and equipment necessary to furnish and install Walkway Cover and accessories hereafter specified and/or indicated on the Drawings.

1.2 <u>Manufacturer</u>

Walkway Cover shall be Tennessee Valley Metals, Peachtree Protective Covers, Inc., Superior Metals, Mitchell Metals or approved equal as long as they meet or exceed specifications and adhere to drawing details.

1.3 Shop Drawings

Shop drawings shall be generated under the services of a structural engineer licensed in the State of Alabama, sealed and signed and submitted to the architect for approval before fabrication. These drawings to show: size, arrangement, foundation and type of material, connections and relationship to adjacent work and compliance with applicable codes.

1.4 <u>Guarantee</u>

The Walkway Cover 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 <u>General</u>

- A. Structural roof system for walkway shall be complete with all required components and accessories as shown on the Drawings and as required.
- B. The system shall be designed to structurally withstand severe icing, heavy hail, and 110 mph wind loads. Minimal structural capacity for all components shall meet the latest edition of the IBC as adopted by the Authority having jurisdiction.

2.2 Concealed Drainage

Water shall drain internally from deck to beams and/or to columns, spouting out at ground level through columns.

2.3 <u>Materials</u>

- A. Roof Panel: The self-supporting aluminum Roof Panel shall be an alloy accurately roll formed to the deep channel design shown on the Drawing. It shall have a depth required for span and be furnished with an interlocking design to provide a weathertight load-bearing deck. The gauge of the panels shall be as required to support the load in accordance with engineering prints and calculations provided by the manufacturer. Material to be baked enamel acrylic. Color as selected by Architect.
- B. Roll-formed Fascia: The fascia shall be accurately roll formed from an aluminum alloy to the sculptured design shown on the drawing so that it will serve as a built-in gutter for roof drainage and as a structural frame member with a height of not less than 6-1/4" and a gutter width of not less than 2-3/8".

Gutter cross sectional area shall be 4 square inches. Fascia gauge shall be as required for the load to be supported in accordance with engineering prints and calculations provided by the manufacturer. Materials to be baked enamel acrylic. Color as selected by Architect.

C. Finish: The enameled finish on roof panels, roll-formed fascia and related enameled components shall be designed for optimum performance in exterior installations under all environmental conditions. The finish shall be applied in accordance with and conform to, or exceed the Painted Sheet "Quality Standards" and recommended ASTM, Military and/or Federal Test Methods specified by the Aluminum Association in their publication "Aluminum Standards & Data".

All exposed materials shall be pre-finished. Color choices shall include industry standard bronze, dark bronze, medium bronze, white, cream, etc.

Galvanized metal shall be solvent clean with VM&P Naphtha. Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish:	Apply two coats
	S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
OR	S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

Non-primed metal shall be cleaned and etched with approved acid and washed with water.

Primer: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310

Finish: Apply two coats

S-W Pro Industrial HP Acrylic Coating, S/G, B66-650

OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600

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.

Spot Pr	imer Coat – S-W Pro Industrial Pro-Cryl Universal Primer,
	B66-310
Cipioh	Apply two costs

- Finish: Apply two coats
 - S-W Pro Industrial HP Acrylic Coating, S/G, B66-650
- OR S-W Pro Industrial HP Acrylic Coating, Gloss, B66-600
- D. Component Accessories: Roof Brackets, Post Brackets, Flashing, etc., shall be of same materials and finishes as specified for prime components. Each part and its use is described in the engineering prints and calculations provided by the manufacturer. Each part shall be used as specified in the aforementioned prints. Posts shall be used as specified. All components must match finish color as selected by Architect.
- E. Hardware: All bolts, nuts, washers, and screws used in joining the members of the canopy together shall be stainless steel up to 1/4" diameter nominal size. Any hardware 1/4" diameter and larger shall be hot dip galvanized to withstand 200 hours' salt spray test of maximum resistance to rust and corrosion. Provide concealed fasteners where possible. All hardware must match finish color as selected by Architect.

3.0 - EXECUTION

3.1 Installation

- A. Installed units shall have the following minimum pitch for water drainage of the roof. Minimum pitch for all panels and fascia: Up to 10'-1/8" ft. Over 10'-1/4" ft.
- B. Installed unit shall be properly caulked with a suitable, high quality material where needed and where specified.
- C. Installed unit shall meet local building code requirements and conform to the engineering prints provided by the manufacturer.
- 3.2 <u>Erection</u>
 - A. Columns and beams shall be aligned with care before columns are grouted. Downspout columns shall be filled to the discharge level to prevent standing water, and downspout deflectors installed after grouting.
 - B. Grout shall be #2000 compressive strength. Mix by volume, 1 part Portland cement and 3 parts masonry sand. Add water to make pouring consistency and vibrate with a small rod to fill voids.
 - C. Extreme care shall be taken to prevent damage or scratching. All workmanship must be of the very best, with neat mitters and fitted joints.
 - Flashing At adjoining construction, as indicated or required.
- 3.4 <u>Clean Up</u>

Remove all debris from the site as it accumulates. Clean Protective Walkway Cover at completion of installation and leave in as new condition.

END OF SECTION

3.3

<u> 1.0 - GENERAL</u>

- 1.1 <u>Scope</u> The work under this section consists of all toilet accessories.
- 1.2 <u>Samples</u> Returnable samples to be furnished upon request.
- 1.3 <u>Manufacturer</u> 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. Paper Towel Dispenser Model B -262 surface mounted to dispense Cfold paper towels, stainless steel finish. One per toilet room. Exclude student gang toilets with electric hand dryers. Verify owner's paper towel type and size for compatibility.
 - 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.
 - Toilet Tissue Dispenser Model B-4288. Surface Mounted, Stainless Steel dispensing. Holds two rolls up to 5-1/4" diameter. One per stall as indicated on drawings.
 - 4. 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.
 - 5. Soap Dispenser (Surface Mount) Model B-4112, liquid valve, surface mounted, stainless steel finish, vandal resistant. One per regular lavatory and as indicated on drawings.
 - 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.
 - Mop and Broom Holder Model B-223 x 36" surface mount, stainless steel, Type 302 (18-8) satin finish. Holders spring loaded, rubber cam with plated steel retainer. Mounting height 6'-0" floor to top. One per service and/or mop sinks.
 - 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.

GYMNASIUM EQUIPMENT - SECTION 11480

A. <u>1.0 - GENERAL</u>

1.1 <u>Summary</u>

- A. The Work required under this Section consists of providing gymnasium equipment complete with, accessories and necessary mounting, and installation hardware.
- B. Related Work Specified Elsewhere
 - 1. Division 3, Concrete; set the volleyball sleeves.
 - 2. Division 5, Metals Sections: Structural steel and steel joints
 - 3. Division 7, Waterproofing
 - 4. Division 9, Finishes; install volleyball sleeve cover plates.
 - 5. Division 16, Electrical; coordinate all electrical.

1.2 Submittals

D.

- A. Comply with Section 01350 Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including materials, components, fabrication, finish, and installation instructions.
- C. Shop Drawings:
 - 1. Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating locations, quantities, dimensions, tolerances, materials, fabrication, connections, hardware, fasteners, finish, electrical wiring diagrams, options, and accessories.
 - 2. Show location and detail of attachment to building structure.
 - Samples: Submit manufacturer's color samples
- E. Design Data:
 - 1. Basketball Backstops:
 - a. Submit manufacturer's design data, indicating static loads and point reactions.
 - b. Submit calculations complete, showing hanger and hoist pulley points.
 - General load charts or generic product laboratory test data will not be considered sufficient data.
- F. Test Reports: Submit manufacturer's certified test reports from testing performed by accredited independent testing laboratory, indicating compliance of materials with requirements as specified.
- G. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- H. Manufacturer's Project References: Submit manufacturer's list of recently completed projects, including project name and location, name of architect, and type and quantity of gymnasium and play field equipment installed.
- I. Warranty: Submit manufacturer's standard, lifetime, and additional warranties.
- 1.3 Project Conditions
 - A. Loose items of equipment shall be turned over to the Owner after un-packaging or uncrating, and checking for proper type, material, size and fit of each accessory. Obtain receipt from Owner for items turned over. No claim may be made for items turned over to the Owner without obtaining a receipt.

1.4 <u>Coordination</u>

- A. Coordinate with Divisions 15 and 16 contractors for installation of the gymnasium equipment. Also coordinate with the Architect for exact locations.
- B. Field Verify existing conditions and coordinate the work of the section accordingly.

1.5 <u>Warranty</u>

- A. Provide 1-year warranty against defects in materials and workmanship, unless otherwise specified.
- 1.6 Quality Assurance
 - A. Single Source Responsibility: Provide gymnasium and play field equipment from single manufacturer.
 - B. Manufacturer's Qualifications: Minimum of 5 consecutive years' experience manufacturing gymnasium and play field equipment similar to that specified.
 - C. Installer's Qualifications: Trained and approved by manufacturer.
 - D. Regulatory Requirements: Gymnasium and play field equipment shall conform to latest rules and regulations.
 - 1. Federation International de Football Association (FIFA).
 - 2. International Basketball Federation / Federation International de Basketball (FIBA).
 - 3. National Association for Girls and Women in Sport (NAGWS).
 - 4. National Basketball Association (NBA).
 - 5. National Collegiate Athletic Association (NCAA).
 - 6. National Federation of State High School Associations (NFHS).
 - 7. USA Volleyball (USAV).

2.0 - PRODUCTS

- 2.1 <u>Materials</u>
 - A. Products of the following manufacturers are acceptable, providing their products equal or exceed the quality specified. Minor differences in construction and products are recognized to exist and may be acceptable. These variations must be submitted to the architect at least 10 days prior to bid date. Acceptance will be established by addendum.
 - 1. <u>Basis of Design:</u> Porter Athletic
 - 2. Other Acceptable Manufacturers Draper and JayPro.

2.2 <u>General</u>

- A. Equipment shall be provided complete as per manufacturer's standard catalog description and specifications for the numbers indicated in the schedule. Equipment to be permanently installed shall be complete and ready for use.
- B. Materials and finishes shall be non-corrosive in type and quality of finish noted or as a part of the manufacturer's printed description or specifications.

Note: Model No. 9095100 has two separate Attachment Height Ranges (18'-28'/28'-32') Trak-fold should be considered when there is not enough space for the rear fold above)

A. Model Number: 90951000 – CEILING SUSPENDED

TRAK-FOLD, BACKWARD FOLD REAR BRACED BACKSTOP 28' TO 32'

ATTACHMENT HEIGHT. GC SHALL VERIFY WITH THE METAL BUILDING SHOP DRAWINGS.

- Basketball backstop shall consist of a main center mast of 6-5/8" O.D. heavy-wall structural steel tube with diagonal side sway braces of 2-1/2" x 1-1/2" rectangular steel tubing. Ends of diagonal brace tubes shall be fully welded to main mast. Top horizontal mast member to be of a heavy 4" structural channel to support adjustable suspension hangers. Mast shall be fully welded and suspended by adjustable hangers (2) to provide for precise plumbing of frame during installation. Support hangers shall be offset a minimum of 1-1/2" behind centerline of welded mast to properly weight lock unit in playing position.
- 2. Each adjustable suspension hanger shall be mounted on a v-guide type, twowheel carrier system (rated at 600 lbs. each) to roll forward on a 5" sloped track system, to allow the vertical drop frame to roll forward during the hoist cycle, to avoid rear obstructions. V-groove, 4" diameter polyurethane track casters shall be furnished with needle roller bearings for ease of operation. Carrier/hanger assembly shall be designed to fully encompass the track system to provide maximum safety.
- 3. Goal shall mount directly through backboard and into a heavy structural steel Center-Strut R weldment which shall be clamped to the vertical 6-5/8" O.D. center support to eliminate any strain on backboard should a player hang on the front mounted goal (conforms to the NCAA latest rules). All fittings shall be attached to the 6-5/8" O.D. vertical drop tube by heavy 1/4" thick precision saddle die-cut formed steel fittings secured in place by 5/8" diameter `U'-Bolt type hardware.
- 4. Backstop to operate with a 1-7/8" O.D. back brace assembly with a folding knee joint. Knee joint to incorporate an internal torsion spring design to lock brace assembly firmly in playing position. Hoist cable shall automatically disengage brace knee joint during the hoist cycle.
- 5. Backstop shall be supported from pipe anchored to roof framing members by precision die formed support fittings or custom attachments as required. All cap screws shall be rated a minimum SAE Grade 5. Grade 2 cap screws will not be approved as equal. Bridged pipes may be required when spans exceed 14'.
- 6. All metal parts shall be powder coated. Color to be selected by Architect from Porter Standard color options. (Contact Porter for custom color requests)
- 7. Backstop provided with specified backboard and goal
- 8. Winch system and control options. (Manual or Electric)
- 9. Warranty: 25 Year limited warranty on backstop structure
- 1. The basketball backstop shall consist of a main center mast of 6-5/8" O.D. heavy-wall structural steel tube with diagonal side sway braces of 2-1/2" x 1-1/2" rectangular steel tubing. Ends of diagonal brace tubes shall be fully welded to main mast. Top horizontal mast member to be of a heavy 4" structural channel to support adjustable suspension hangers. Mast shall be fully welded and suspended by adjustable hangers (2) to provide for precise plumbing of frame during installation. Support hangers shall be offset a minimum of 1-1/2" behind centerline of welded mast to properly weight lock unit in playing position.
- 2. Each adjustable suspension hanger shall be mounted on a v-guide type, twowheel carrier system (rated at 600 lbs. each) to roll forward on a 5 sloped track system, to allow the vertical drop frame to roll forward during the hoist cycle, to avoid rear obstructions. V-groove, 4" diameter polyurethane track casters shall be furnished with needle roller bearings for ease of operation. Carrier/hanger assembly shall be designed to fully encompass the track system to provide maximum safety.

- 3. Goal shall mount directly through backboard and into a heavy structural steel Center-Strut R weldment which shall be clamped to the vertical 6-5/8" O.D. center support to eliminate any strain on backboard should a player hang on the front mounted goal (conforms to the NCAA latest rules). All fittings shall be attached to the 6-5/8" O.D. vertical drop tube by heavy 1/4" thick precision saddle die-cut formed steel fittings secured in place by 5/8" diameter `U'-Bolt type hardware.
- 4. Backstop to operate with a 2-3/8" O.D. back brace assembly with a folding knee joint. Knee joint to incorporate an internal torsion spring design to lock brace assembly firmly in playing position. Hoist cable shall automatically disengage brace knee joint during the hoist cycle.
- 5. Backstop shall be supported from pipe anchored to roof framing members by precision die formed support fittings or custom attachments as required. All cap screws shall be rated a minimum SAE Grade 5. Grade 2 cap screws will not be approved as equal. Bridged pipes may be required when spans exceed 14'.
- 6. All metal parts shall be powder coated. Color to be selected by Architect from Porter Standard color options. (Contact Porter for custom color requests)
- 7. Backstop provided with specified backboard and goal .
- 8. See winch system and control options. (Manual or Electric)
- 9. Warranty: 25 Year limited warranty on backstop structure

2.3 Rectangular Glass Backboards

- A. Basketball Backboards: Model No. 208 rectangular backboard by Porter Athletic, Champaign, Illinois
 - 1. Provide for each Model #: 923 backstop.
 - 2. Backboards: 2-5/16-inch thick frame, 72 inches by 42 inches, 1/2-inch tempered plate glass cushioned in unitized steel-tubing frame.
 - 3. Perimeter: Glare-free aluminum.
 - 4. Standard White Borders and Target Area: Fired into glass permanently.
 - 5. Warranty: limited lifetime warranty against breakage.
- B. Basketball Backboard Padding: Model No. 326 Pro Pad bolt-on positiveattachment backboard pad.
 - 1. Provide for each rectangular glass backboard, along bottom of backboard and up 15 inches on each side, meeting NCAA and NFSHSA rules.
 - 2. Pads: 2-inch thick, molded from 9-pound density polyurethane foam with integral skin.
 - Color: To be selected by Architect from manufacturer's standard color. offerings
 - 4. Warranty: 8 years.

2.4 Basketball Goals

- A. Basketball Goals: Model No. 00256-500 Torq-Flex adjustable goal as manufactured by Porter Athletic, Champaign, Illinois
 - 1. Provide for each Model No. 923 backboard.
 - 2. Compliance: Meets NCAA and FIBA recommendations for rebound performance.
 - 3. Steel Torsion-Rod Pivot/Tension Mechanism: Ensure goal maintains original elasticity and rebound characteristics for minimum of 5 years. Provides maintenance-free goal.
 - 4. Net Attachment: Tube-tie net attachment on rim to eliminate conventional wire-formed net locks. Prevents players from injuring fingers during play.

- 5. Mounting Goal: Goal mounted to backboard with concealed hardware.
- 6. Net: Anti-whip, white net.
- 7. Finish: Official orange powder coated.
- 8. Warranty: limited 5 year warranty

2.5 <u>Electric Winch</u>

- A. Basketball Backstop Winches, General:
 - 1. Hoist Cable: Of sufficient length to each backstop. 1/4-inch diameter galvanized aircraft-type cable, minimum of 7,000 pounds ultimate.
 - Swivel Pulleys: 4-inch diameter cast ductile iron pulley sheave with maintenance-free, oil-impregnated bearing for proper hoist cable routing to winch.
 - Pulley Assembly and Attachment to 3-1/2-Inch O.D. Support Structure: Rated at minimum 9,000-pound load rating. Furnish certified test results with submittals.
- B. Heavy-Duty Electric Winches:
 - 1. For each Model No. 923 backstop.
 - 2. Hold units at any position when raising or lowering.
 - Electric Motor: Individually operate units by 3/4-hp, 13-amp, capacitortype, 60-cycle, 115-V AC, single-phase, electric motor with automatic thermal-overload protection, manufactured to NEMA specifications.
 - 4. Fully Enclosed Gear Set: Set in oil bath and factory sealed to eliminate need for lubrication.
 - 5. Cable Drum: Grooved to provide neat and consistent cable tracking.
 - 6. Gear Shaft: Connect directly to drum hoist without use of chain.
 - 7. Warranty: limited 5 year warranty
- 2.6 Touch-Pad Master Control System: Powr-Touch Control System
 - A. Touch-Pad Master Control System: Model No. 12555100 Powr-Touch 2.5 simultaneous operation gymnasium control center.
 - 1. Operation: Push-button control system capable of operating a maximum of 128 basketball backstops or other gymnasium equipment and a maximum of 32 units of auxiliary gymnasium electrical equipment.
 - 2 Operation Safety: For safety of operation, touch pad requires constant pressure on pad button to control gymnasium equipment.
 - 3. Control of Auxiliary Equipment: Single touch of appropriate button.
 - 4. Basketball backstops or height adjusters shall be operated individually or simultaneously by pressing single button.
 - 5. Each Relay: Programmed to accept 8 memory address assignments for a maximum of 8 different operation combinations for each basketball backstop, height adjuster, or curtain. Operate 1, 2, 3, and up to 8 units individually or simultaneously, curtain simultaneous maximum is 4 units.
 - Desired Operation Mode: Selected at touch pad by entering assigned backstop, height adjuster, or curtain number or combination backstops or height adjusters number.
 - 7. Security Code: Four-digit reprogrammable security code to prevent unauthorized use.
 - 8. Time Delay: Touch pad shall automatically revert back to secure mode if no button is used within 30 seconds.
 - 9. Multiple Locations: Maximum of 7 touch pads may be used when operation from various locations is desirable.

- Mounting: Flush mounted in standard 2-gang electrical box, 4 inches by 4 inches by 2-1/2 inches, with 12-volt control circuit to relay panels located on walls or roof framing structure.
- 11. Relay Panels: Minimum of 1 dual-powered relay panel, with a maximum of 16 relay panels per network. Each relay panel shall contain 2 banks of eight 30-amp relays for operating 8 momentary-controlled type (up and down), 120-volt or low-voltage pieces of equipment. Each bank of relays shall be independently powered by 120-volt line power, with 2 dedicated circuit breakers per relay panel. Each relay panel shall include 2 maintained 30-amp relays.
- 12. Relay Panel Enclosure: 4-3/8 inches by 14 inches by 17 inches.
- 13. Touch Pad LEDs: Tri-color LED at touch pad for positive user feedback. Illuminates when proper security code is entered (green), when confirming touch pad button is fully depressed (amber), and while operating equipment up or down (red). Additional LEDs at touch pad and relay panel circuit boards to ensure system is receiving power, wired correctly, and relays are functioning properly.
- 14. Touch Pad Wiring: Fuse protected for additional circuit protection.
- 15. Warranty: limited 5 year warranty
- B. Wiring: Install electric power and hook-up of electric controllers.
 - 1. Materials: Conduit, wire, and boxes for power and control of key switches, touch pad, and motors to be furnished and installed as specified in Division 16 (Division 26) electrical section.
 - 2. Hook-Ups: Complete and final hook-up of motors and electrical devises as specified in Division 16 (Division 26) electrical section.

2.7 Backstop Auto Lock Safety Strap

- A. Safety Locks: Model No. 797 Saf-Strap safety lock.
 - 1. For each Model No. 923 backstop.
 - Lock: Inertia sensitive to automatically lock basketball backstop in position at any time in storage or during raising or lowering cycle, due to sudden surge of speed created by possible malfunction of hoisting apparatus.
 - Reset: Fully automatic reset requiring no poles, ropes, levers, or buttons.
- 2.8 Electric Basketball Backstop Height Adjuster
 - A. Provide height adjustment with compact, 115-volt, 60-Hz, electric gear motor linear actuator, providing 600-pound thrust capacity to raise and lower unit.
 - 1. Integral Limit Switches: Automatically shut off when goal height reaches 8'-0" and 10'-0".
 - 2. Motor: Controlled by Sportsonic radio-controlled system.
 - Transmitter: Provide 1 Sportsonic portable hand-held transmitter for each project site. Capable of operating basketball backstop and/or gymnasium divider curtains.
 - Receiver: Provide for each height adjuster, Sportsonic commercial-type receiver coded to operate with transmitter. Factory wired and installed in standard 9-1/2-inch by 6-inch by 3-1/2-inch metal enclosure with 54-inch long flex conduit with twist-lock grounded plug attached.
- 2.9 Volleyball Floor Plate/Sleeves
 - A. Floor Sleeves and Cover Plates: Model No. 00870200 floor sleeve.

- 1. Floor Sleeve: 3-3/4-inch O.D. heavy-wall steel tubing, extending 9 inches into grout footing.
- 2. Cover Plate: Brass plated. 5-inch O.D. by 1/2-inch thick recessed collar, cork gasket, and cover.
- 3. Swivel Retainer Pin in Collar: Prevent theft.
- 4. Cover removal key.

2.10 Volleyball Standards

- A. Volleyball Systems: Model No. 01971-000 Powr-Rib II volleyball system.
 - 1. Standards: 3-1/2-inch O.D., high-strength, lightweight, aluminum Alloy 6063-T6, with 2 internal reinforcing ribs for maximum rigidity and minimum deflection. Include height-marking labels.
 - 2. Volleyball Upright: Equipped with sliding-collar devices with springloaded pin to guide height setting collar up and down standard without rotating. Height settings secured with pressure-locking T-handle assembly.
 - Collar: Allow volleyball standard to be infinitely height adjustable for instant net height setting for volleyball, badminton, and tennis. Lock in place with pressure-locking T-handle.
 - 4. Each System: 1 winch post and 1 end post.
 - 5. Winch Post: Equipped with heavy-duty power winch.
 - 6. End Post: Collar assembly for net tie-off.
 - Power Winch: Heavy-duty, self-locking ratchet with disc-brake release mechanism for safest tensioning system. 1-3/4-inch wide, high-tensile, nylon strap and durable snap hook. Removable handle to prevent unauthorized use.
 - 8. Cap: Molded cap on top and bottom to protect against gymnasium floor damage.
 - 9. Finish of Post: Clear anodized.
 - 10. Warranty: limited 5 year warranty

2.11 Protective Padding

- A. Model No. 00839-000 protective padding
 - 1. Compliance: Meet current competition requirements as prescribed by USAV, NFHS, and NCAA for player protection and safety.
 - 2. Padding: Extend to height of 6'-0".
 - 3. Construction: Firm, 1-1/4-inch thick, closed-cell protective filler. Covered in durable, vinyl-reinforced fabric. Velcro closure.
 - 4. Each Pad: Tailored with 4 vertical, miter cuts to fold around upright and store compactly.
 - 5. Pads Installed on Uprights: Narrow profile of 7-1/2 inches by 11-1/4 inches, to provide for maximum visibility for judges and spectators.
 - Color: To be selected by Architect from Porter Athletic's standard color offerings
 - 7. Net Attachment: One side of pad has cut-out to accommodate net attachment.

2.12 Volleyball Nets

- A. Model No. 02295-xxx volleyball net.
 - 1. Compliance: Meet requirements of USAV, NCAA, NFHS, and NAGWS.
 - 2. Nets: 32 feet by 39 inches with 42'-6", 1/8-inch diameter galvanized cable along top.

- 3. End Hems: 4-inch width with 1/2-inch diameter fiberglass dowel to provide rigidity and tailored square hanging net.
- 4. Each End Hem: Equipped with three 1-inch wide polypropylene webtension straps and quick-adjust tension clips.
- 5. Netting: 4-inch square, heavy-duty, #24 black nylon mesh with 2-inch wide, vinyl-coated, polyester hem double-stitched across top of net.

2.13 Net Antenna / Boundary Markers

- A. Model No. 02296-100 Powr-Line net antenna with clamp.
 - 1. Antenna Clamps: Included with net antenna. As 1 complete unit, clamps shall snap easily and securely into place.
 - 2. Antenna Size: 3/8-inch diameter by 6-foot long fiberglass dowels.
 - 3. Antenna Markings: Alternately marked red and white.
- B. Boundary Markers: Model No. 02297 boundary markers.
 - 1. 2-inch wide, durable, white, polyester-reinforced vinyl material with white Velcro attachment strips sewn in place for securing to competition volleyball net.

2.14 Volleyball System Storage

- A. Volleyball Storage and Transport Carts: Model No. 00956-100 volleyball storage/transport system.
 - 1. Capacity: Store and transport 6 sleeve-type volleyball standards, 1 judge's stand with pads, 3 nets including antennae, and 3 sets of upright pads.
 - 2. Overall Size: 4'-3/8" in length, 3'-2-1/4" in height, and 2'-6-1/4" in width, to allow transporter to pass through typical 3-foot wide doorway.
 - 3. Frame: Heavy-duty steel transport frame. Heavy-wall, 2-1/2-inch by 1-1/2-inch rectangular steel tubing.
 - 4. Hooks: Heavy-formed steel hooks. Provided on side diagonal frame members for storage of standards. Covered in vinyl material to protect finish on upright posts.
 - 5. Storage Pouch: Large vinyl nylon net storage pouch. Provided with tunnel loops and Velcro flaps for attaching to transport frame.
 - 6. Casters: Bottom of transport on four, 3-1/2-inch diameter, heavy-duty, swivel casters.
- 2.15 Protective Wall Padding

1.

- A. Non-fire Retardant Wall Padding: Model No. 00560-0XX HiNRG SAFPAD.
 - Shock Absorption: ASTM F 2440, meet minimum standard.
 - a. Maximum Drop Height: 5 feet.
 - b. gmax: 166.5.
 - c. HIC: 656.5.
 - 2. Cover Material: Designated as flame resistant in accordance with NFPA 701 and State of California, Registered Fabric No. F-140.
 - 3. Wall Pad Dimensions: 2'-0" wide by 6'-0" high.
 - Nailing Margin: 1-inch nailing margin top and bottom for securing panels to wall.
 - 5. Foam: 2-inch thick, rebonded foam.
 - 6. Interior Foam: Bonded to 7/16-inch OSB to minimize warping.
 - 7. Entire Face of Panel, Including Nailing Margins: Upholstered in 14ounce, fire-retardant, high-tensile, vinyl-coated polyester fabric material with leather-like embossed finish.
 - 8. Cover Material Tear Strength: 100 psi.

- 9. Cover Material Properties: Mildew resistant, rot resistant, with infectioncombating fungicide.
- 10. Fold and securely staple cover to backside of OSB.
- 11. Color: To be selected by Architect from Porter Athletic's standard color offerings

3.0 - EXECUTION

- 3.1 <u>Preparation</u>
 - A. Make such arrangements as necessary to provide scaffolding to perform Work under this Section. Damage to floors, walls, equipment and the like shall be corrected at the expense of Contractor under this Section.
- 3.2 Installation, General
 - A. Install equipment in accordance with manufacturer's printed instructions, drawings, specifications and approved shop drawings. Complete equipment field assembly, where required.
 - B. Unless otherwise indicated, install gymnasium equipment after other finishing operations, including painting, have been completed.
 - C. Permanent Gymnasium Equipment: Rigid, level, plumb, square and true; anchored securely to supporting structure; positioned at locations and elevations indicated on Shop Drawings; in proper relation to adjacent construction; and aligned with court layout.
 - 1. Floor Insert Location: Coordinate location with application of game lines and markers.
 - 2. Floor Insert Elevation: Coordinate installed heights of floor insert with installation and field finishing of finish flooring and type of floor plate.
 - D. Floor Insert Setting: Grout sleeve for post standards in oversized, waterproofed recessed voids in concrete slabs. Clean holes of debris. Position sleeve and fill void around sleeves with grout, mixed and placed to comply with grout manufacturer's written instructions. Verify that sleeves are set plumb, aligned and at correct height and spacing and held in position during placement and finishing operations until grout is cured. Set insert so top of unit is flush with finished flooring surface.
 - E. Portable Gymnasium Equipment: Assemble in place to verify equipment and components are complete and in proper working order. Disassemble portable gymnasium equipment after assembled configuration has been approved by Architect and store units in location indicated on Drawings.

3.3 Demonstration

A. Work under this Section shall include demonstrating the proper use and operation of equipment to the Owner as required. Instruct Owner's designated authorized personnel in properly handling, assembling, adjusting, disassembling, transporting, storing and maintaining units.

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1.0 - GENERAL

- 1.1 <u>Section Includes</u>
 - A. Four-face electronic scoreboard Model 2665 -4 and control console for indoor use.
 - B. Single-face electronic scoreboard Model 2350 and control for indoor use.
 - C. Accessories for both models.
- 1.2 <u>References</u>
 - A. Standard for Electric Signs, UL-48, 14th Edition.
 - B. Standard for Control Centers for Changing Message Type Signs, UL-1433, 4th Edition.
 - C. Federal Communications Commission Regulation Part 15.
 - D. National Electric Code.
- 1.3 <u>Submittals</u>
 - A. Provide Scoreboard owner's handbook including drawings, sample warranty and other information needed for installation, operation, and maintenance of the scoreboard and accessories.
- 1.4 <u>Quality Assurance</u>
 - A. Source limitation: Provide all components including scoreboard, control console, data cable, mounting hardware, and other accessories from a single manufacturer for a complete and fully functional system.
 - B. Manufacturer qualifications: Require company specializing in manufacturing electronic scoreboards with a minimum of ten years experience.
 - C. Installation shall be done by manufacturer's authorized installers.
 - D. Adherence to nationally recognized standards.
 1. ETL listed to UL Standards 48 and 1433.
 - 2. NEC compliant.
 - 3. FCC compliant.
 - E. For indoor use only.
- 1.5 Delivery, Storage, And Handling
 - A. Product delivered to installation site unless otherwise specified.
 - B. Scoreboard and accessories to be stored in a clean, dry environment.

- C. Special precautions for the scoreboard face.
 - 1. Each scoreboard section will be protected during shipment by a layer of cardboard or other sheet material. Avoid removing this protective sheet until the installation begins.
 - Never lay a scoreboard face down or stack other objects on a scoreboard lying on its back.
 - 3. Avoid sliding objects (like another scoreboard) along the plane of the scoreboard face even if the protective sheet is in place. This can result in LEDs being sheared.

1.6 Project Conditions

- A. Scoreboard and accessories should not be installed until the area has been made weatherproof.
- B. The architect shall determine location of scoreboard, control console, and other accessories.
- C. The Installing Contractor shall be responsible for making certain the placement of the scoreboard does not violate local building codes or league rules regarding overhead clearance or interfere with play on the court, visibility from the stands, or lighting.
- D. The Installing Contractor shall verify that the mounting structure is capable of supporting the weight of the scoreboard, additional panel, and other accessories.
- E. The scoreboard location requires four standard grounded 120 VAC electrical outlets.
- F. The control console location requires one standard grounded 120 VAC electrical outlet.

1.7 Warranty

- A. Five year limited warranty includes factory labor and material costs for repairing or replacing defective parts. Provide sample of the warranty document with shop drawing submittal.
- B. Warranty coverage period shall be effective from Date of Substantial Completion.

1.8 <u>Maintenance</u>

- A. Replacement parts and factory repair options available from manufacturer.
- B. Product support provided by experienced technicians and online documentation available via phone, web, and email at no cost to customer.

2.0 - PRODUCTS

- 2.1 <u>Manufacturer</u>
 - A. Basis of Design Electro-Mech Scoreboard Co.
2.2 Scoreboards

1.

A. Provide two (2) wall mounted Model 2350 scoreboard units as indicated for Gymnasium A105 as indicated.

- Functions and Features: Model 2350 Indoor Scoreboard is designed to present information pertinent to basketball, volleyball, wrestling and other indoor sports. This scoreboard unit shall be provided to interface and operate in conjunction with other scoreboard units located within the same gymnasium. Presentation on each face includes:
 - a. Four-digit Clock with illuminated colon/decimal indicator that can count up in MM:SS format, count down in MM:SS or SS.T format, or show time of day in HH:MM format. Clock digits are 12 inches tall and made from red LEDs.
 - b. Guest and Home Scores to 199. Score digits are 12 inches tall and made from amber LEDs.
 - c. Period to 9. The Period digit is 9 inches tall and made from green LEDs.
 - d. Guest and Home Bonus indicators made from green LEDs.
 - e. Guest and Home Next Possession indicators made from red LEDs.
 - f. Integrated Horn
 - g. Two dedicated 120 VAC outputs for optional visual horn indicators.
 - h. One data output for daisy chaining additional scoreboards or shot clocks. Typically the four scoreboard sections are synchronized by bringing data cable from the console to the data input jack one section, running a provided jumper cable from the data output jack of that scoreboard section to the data input jack of the next scoreboard section, and so on until all four sections are connected.

2. Cabinet Size

- a. Standard model (with no side ID panel): 9 feet wide, 35 inches tall, 6 inches deep.
- b. With optional ID panel on left: 12 feet wide, 35 inches tall, 6 inches deep.
- c. With two optional ID panels (left and right): 15 feet wide, 35 inches tall, 6 inches deep.
- 3. Cabinet Weight (of each scoreboard section).
- a. Standard model (with no side ID panel): 85 pounds.
- b. With optional D panel on left: 100 pounds.
- c. With two optional ID panels (left and right): 115 pounds.

2.3 <u>Accessories</u>

A. Standard Accessories to be provided for Model 2350

- 1. Control Console.
 - a. Supports all features of Electro-Mech 2000 series basketball scoreboards without the need to enter codes or other information to configure the device. Player stat panels require separate custom control consoles.
 - b. Provides direct data outputs for up to four scoreboards and shot clocks all synchronized to the data (including the time) generated by the control console. Additional displays may be controlled in synchronization by daisy chaining from the data outputs of scoreboards connected to the control console.
 - c. Constructed of a heavy-duty ABS plastic housing holding a 0.1-inch thick keypad panel with stainless steel metal dome switches that provide tactile feedback and are rated for one million actuations.
 - d. Requires one standard grounded 120 VAC electrical outlet.
- 2. Extension Cables: 10-foot long shielded data cable with male stereo connectors at each end allows control console to be connected to a junction box (or ScoreLink transmitter) at the point of operation and later unplugged for storage.
- 3. Junction Box: Provides a point of termination for the data cable with a stereo socket for quick connection to the control console.
- 4. Stereo Plug With Pigtail: Provides a connector to be spliced onto the data cable at the scoreboard end.
- 5. Mounting hardware: The scoreboard cabinet is shipped with two keyhole plates attached to the top rear frame designed to allow the scoreboard to be suspended from lag bolts mounted in the wall. Two eyebolt mounted in the top of the frame may be used to lift the scoreboard cabinet and may also provide a permanent attachment points for suspension cables.
- B. Other Accessories to be provided:
 - 1. Data Cable: A shielded two-conductor cable with a drain line is the typical means of providing a path for data from the control console to the scoreboard.
 - 2. ID Panels: This scoreboard may be ordered with an ID panel integrated into the cabinet on the left side or with two integrated panels flanking the scoreboard. An additional panel shipped as a separate cabinet, may be added along the bottom. These panels may be purchased blank or with simple text, multi-colored text and graphics, or screen-printed processedcolor logos applied to their faces.
 - 3. Carrying Case For Control Console: Included with the ScoreLink system, this option is also available for scoreboards with hard-wired data cables.
 - 4. Handheld Clock Start/ Stop Control: Provides a hand-held pendant that allows the clock operator to start and stop the Game Clock without touching the control console.
 - 5. Visual Horn Indicators: Designed to illuminate whenever the scoreboard horn sounds. These indicators must attach to receptacles provided on the scoreboard cabinet.

- 2.4 <u>Finish</u>
 - A. Standard scoreboard faces, digit masks, and the exposed areas of the corner pieces are coated with low gloss black polyester resin paint for maximum contrast and resistance to scratches.
 - 1. Baked on automotive grade low gloss paint in a selection of standard colors is available from the manufacturer for the scoreboard faces and corners.
 - 2. Non-standard colors and finishes may be applied to the scoreboard faces and corners at the customer's request.
 - B. Scoreboard and corner framing and back are mill-finished aluminum.
 - C. Captions and other decorative elements on the face of the scoreboard are vinyl.
- 2.5 <u>Source Quality Control</u>
 - A. Provide the following Tests and Inspections.
 - 1. Manufacturer requires sub-contracted printed circuit board subassemblies to undergo functional testing at the point of manufacture.
 - 2. Manufacturer inspects incoming components prior to installation in scoreboard and accessories.
 - 3. Manufacturer functionally tests major electrical subcomponents prior to installation in scoreboard and accessories.
 - 4. Manufacturer inspects and tests scoreboards and accessories at full power prior to shipment.
 - 5. Manufacturer performs a test assembly on all scoreboard sections and corner sections prior to packaging to ensure proper fit.

3.0 - EXECUTION

- 3.1 Examination
 - A. Verify 120 VAC outlets at scoreboard and control console locations are properly grounded.
 - B. If data cable is used, verify continuity from scoreboard to control console locations.
 - C. Verify data cable and AC power cable are not run in the same conduit or wire tray.
 - D. Verify data cable and AC power cable are secure and run in conduit where they might be exposed to abuse or where local, state, or national codes require.
 - E. Verify location of scoreboard, junction box (or boxes), and accessories with customer.
 - F. Test each scoreboard section and control console by attaching units to power and plugging console output into scoreboard data input prior to hanging the complete assembly.
- 3.2 Installation

- A. Installing Contractor shall install scoreboards in accordance with Manufacturer's written installation instructions.
- B. Scoreboard Manufacturer's representative shall provide training to Owner's representative(s) to demonstrate proper operation and maintenance of scoreboards and accessories.
- C. Installing Contractor shall remove all packaging materials and other installation related debris from site upon completion of installation.
- 3.3 Close Out Procedures
 - A. Provide three (3) sets of Operating and Maintenance Manuals along with (3) copies of Manufacturer's Warranty. See Section 01910.
- 3.4 Protection (Post Installation)
 - A. The most common sources of damage to scoreboards and accessories are electrical surges running through power or data connections. The usual causes are lightning, power equipment problems (floating neutrals, bad transformers, etc.), and improper connections. To minimize these problems:
 - 1. Ensure electrical wiring is properly grounded.
 - Unplug control console from power outlet and from data cable when not in use.
 - 3. Turn off the breaker to disconnect scoreboard from power when not in use.
 - Label scoreboard data cable junction box and all connectors near junction box, scoreboard, and accessories so that public address systems and other devices with similar connections are not accidentally plugged into the scoreboard.
 - 5. Avoid loss or damage of control console, extension cable, and other accessories by storing when not in use.

<u> 1.0 - GENERAL</u>

- 1.1 <u>Scope</u> The work of this section consists of furnishing and installing complete, all miscellaneous furnishings and fixture items as indicated.
- 1.2 <u>Submittals</u> 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 <u>Fire Extinguisher Cabinets</u> (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 <u>Fire Extinguisher</u> (FE)
 - A. <u>Cabinet Mounted</u> 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. <u>Wall Mounted</u> 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.

3.0 - EXECUTION

- 3.1 <u>Installation</u> 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.

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

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 <u>all existing signage types and styles</u> <u>currently installed</u> to provide a continuity of design to the owner as required.
- 1.3 <u>Submittals</u> Shop drawings shall be submitted.

2.0 - PRODUCTS

- 2.1 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.
- 2.2 <u>KnoxBox</u> Provide one Standard Capacity Model 3274 KnoxBox 3200 - Location as directed by the Architect Color: Dark Bronze Mount Type: Standard Mount Tamper Switch Type: Fire Alarm/Panel
 - 2.3 <u>Project Sign</u> Specification requirements are listed in Section 01030.

3.0 - EXECUTION

- 3.1 <u>Installation</u> Installation of all items shall be in full conformity with manufacturer's specifications, recommendations, and approved details.
- 3.2 <u>Installation of Building Letters</u> Install building letters on surfaces and at heights as directed. Install in accordance with manufacturer's recommendations.
- 3.3 Installation of Plaque(s) Install plaque(s) where directed.

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 <u>Submittals</u>
 - 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.
 - 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 <u>Manufacturers:</u>

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:
 - 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 <u>Section 01360 –</u> <u>Product Substitution Procedures.</u>

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 45pound 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.
- 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.
 - 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

Α.

- 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

Α.

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:
 - 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:
 - 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 predrilled 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:
 - 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:
 - a. Alike Per Room & Master** (100 maximum combinations)
 - 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 <u>Fabrication</u>:
 - 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.

- 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.
- 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 pullout shelves in the line boring for consistent alignment.
- 6. Exposed and semi exposed edges. Edging: 1mm PVC.
- 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:
 - 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.
 - Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
 - 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 <u>Preparation</u>

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.

TELESCOPING GYM SEATS SPECIFICATIONS - SECTION 12760

1.0 - GENERAL

- 1.1 <u>Summary</u>
 - A. Section Includes: Telescoping Gym Seating, electrically operated, systems of multiple-tiered seating rows comprising of seat, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.
 - 1. Typical applications include the following:
 - a. Wall Attached Telescoping Gym Seats.
 - B. Related Sections:
 - Division 9 finishes sections for adequate floor & wall construction for operation of Telescoping Gym Seats. Flooring shall be level and rear wall plumb within 1/8" in 8'-0. Maximum bleacher force on the floor, of a 25'-6" section, shall be a static point load of less than 300 psi.
 - 2. Division 16 Electrical sections for electrical wiring and connections for electrically operated Telescoping Gym Seats.
 - C. Qualifications:
 - Bidders are required to be an authorized dealer or manufacturer for equipment proposed which on a day-to-day basis regularly provide the equipment offered. Bidders are further advised only standard production models or standard options will be acceptable for award. Equipment offered shall be currently manufactured on an active assembly line. The approved equipment shall be provided, installed, and serviced by Authorized Dealers capable of providing references.
 - 2. Installer Qualifications:

Bleacher installer shall be Factory Certified by the Manufacturer. Proof of Factory Certified Installation Certificate must be provided upon request. Failure to provide this information may result in rejection of bid.

1.2 <u>References</u>

- A. National Fire Protection Association (NFPA)
 - 1. NFPA 102 Standard for Assembly Seating, Tents and Membrane Structures.
- B. American Welding society (AWS):
 - 1. AWS D1.1 Structural Welding Code Steel.
 - 2. AWS D1.3 Structural Welding Code Sheet Steel.

- C. American Institute of Steel Construction (AISC):
 - 1. AISC Design of Hot Rolled Steel Structural Members.
- D. American National Standards Institute (ANSI).
- E. American Iron & Steel Institute (AISI):
 - 1. AISI Design Cold Formed Steel Structural Members.
- F. Aluminum Association (AA):
 - 1. AA Aluminum Structures, Construction Manual Series.
- G. American Society for Testing Materials (ASTM):
 - 1. ASTM Standard Specification for Properties of Materials.
- H. National Forest Products Association (NFoPA):
 - 1. NFoPA National Design Specification for Wood Construction.
- I. Southern Pine Inspection Bureau (SPIB):
 - 1. SPIB Standard Grading Rules for Southern Pine.
- J. National Bureau of Standards/Products Standard (NBS/PS):
 - 1. PS1 Construction and Industrial Plywood.
- K. Americans with Disability Act (ADA)
 - 1. ADA Standards for Accessible Design.

1.3 Manufacturer's System Engineering Description

- A. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections.
 Apply each load to produce maximum stress in each respective component of each gym seat unit.
 - Design Loads: Comply with NFPA 102, 1992 Edition, Chapter 5 for design loads.
- B. Manufacturer's System Design Criteria:
 - 1. Gymnasium seat assembly; Design to support and resist, in addition to it's own weight, the following forces:
 - a. Live load of 120 lbs per linear foot on seats and decking

- b. Uniformly distributed live load of not less than 100 lbs per sq. ft. of gross horizontal projection.
- c. Parallel sway load of 24 lbs. per linear foot of row combined with (b.) above
- d. Perpendicular sway load of 10 lbs. per linear foot of row combined with (b.) above
- 2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:
 - a. Concentrated load of 200 lbs. applied at any point and in any direction.
 - b. Uniform load of 50 lbs. per foot applied in any direction.
- 3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:
 - a. Concentrated load of 200 lbs. applied at any point and in any direction along top rail.
 - Uniform load of 50 lbs. per foot applied horizontally at top rail and a simultaneous uniform load of 100 lbs. per foot applied vertically downward.
- Member Sizes and Connections: Design criteria (current edition) of the following shall be the basis for calculation of member sizes and connections:
 - a. AISC: Manual of Steel Construction
 - b. AISI: Specification for Design of Cold Formed Steel

Structural Members

- c. AA: Specification for Aluminum Structures
- d. NFOPA: National Design Guide For Wood Construction.
- 1.4 <u>Submittals</u>
 - A. Section Cross-Reference: Required submittals in accordance with "Conditions of the Contract" and Division 1 General Requirements sections of this "Project Manual."
 - B. Project Data: Manufacturer's product data for each system. Include the following:
 - 1. Project list: Ten (10) seating projects of similar size, complexity and in service for at least five (5) years.

- 2. Deviations: List of all deviations from these project specifications.
- C. Shop Drawings: Indicate Telescoping Gym Seat assembly layout. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.
 - 1. Wiring Diagrams: Indicate electrical wiring and connections.
 - 2. Graphics Layout Drawings: Indicate pattern and seat colors
- D. Samples: Seat materials and color finish as selected by Architect from manufacturers offered color finishes. Including Standard Colors and Select Colors if applicable.
- E. Manufacturer Qualifications: Certification of insurance coverage and manufacturing experience of manufacturer, and copy of a telescopic load test to all loads described in 1.03 above, observed by a qualified independent testing laboratory, and certified by a registered professional structural engineer verifying the integrity of the manufacturer's geometry design and base structural assumptions.
- F. Installer Qualifications: Installer qualifications indicating capability, experience, and official Certification Card issued by manufacturer of telescopic seating.
- G. Engineer Qualifications: Certification by a professional engineer registered in the state of manufacturer that the equipment to be supplied meets or exceeds the design criteria of this specification.
- H. Operating/Maintenance Manuals: Provide to Owner maintenance manuals. Demonstrate operating procedures, recommended maintenance and inspection program.
- I. Warranty: Manufacturers ten (10) year warranty documents.

1.5 Quality Assurance

- A. Seating Layout: Comply with current NFPA 102 Standard for Assembly seating, Tents, and Membrane Structures, and specifically with Folding and Telescopic Seating, except where additional requirements are indicated or imposed by authorities having jurisdiction.
- B. Welding Standards & Qualification: Comply with AWS D1.1 Structural Welding Code- Steel and AWS D1.3 Structural Welding Code - Sheet Steel.
- C. Manufacturer Qualifications: Manufacturer who has a minimum of 15 years of experience manufacturing telescoping gym seats and can demonstrate continual design enhancement and 15-year minimum product life-cycle support of telescopic seating.
- D. Installer Qualifications: Engage experienced Installer who has specialized in installation of telescoping gym seat types similar to types required for this project

and who carries an official Certification Card issued by telescoping gym seat manufacturer.

- E. Engineer Qualifications: Engage licensed professional engineer experienced in providing engineering services of the kind indicated that have resulted in the successful installation of telescoping bleachers similar in material, design, fabrication, and extent to those types indicated for this project.
- 1.6 Delivery, Storage and Handling
 - A. Deliver telescopic gym seats in manufacturers packaging clearly labeled with manufacturer name and content.
 - B. Handle seating equipment in a manner to prevent damage.
 - C. Deliver the seating at a scheduled time for installation that will not interfere with other trades operating in the building.

1.7 Project Conditions

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping bleachers installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.8 <u>Warranty</u>

- A. Manufacturer's Product Warranty: Submit manufacturer's TEN YEAR warranty form for telescoping bleachers. This warranty is in addition to, and not a limitation of other rights Owner may have under Contract Documents.
 - 1. Warranty Period: Ten (10) years from Date of Acceptance.
 - 2. Beneficiary: Issue warranty in legal name of project Owner.
 - 3. Warranty Acceptance: Owner is sole authority who will determine acceptance of warranty documents.

1.9 Maintenance and Operation

- A. Instructions: Both operation and maintenance shall be transmitted to the Owner by the manufacturer of the seating or their representative.
- B. Service: Maintenance and operation of the seating system shall be the responsibility of the Owner or his duly authorized representative, and shall include the following:
 - 1. Operation of the Seating System shall be supervised by responsible personnel who will ensure that the operation is in accordance with the manufacturer's instructions.

- 2. Only attachments specifically approved by the manufacturer for the specific installation shall be attached to the seating.
- An annual inspection and required maintenance of each seating system shall be performed to ensure safe conditions. The inspection should be performed by a professional engineer or factory qualified service personnel.

2.0 - PRODUCTS

- 2.1 <u>Manufacturers</u>
 - A. Basis-of-Design: Hussey Seating Company, U.S.A.
 - 1. MAXAM Telescopic Gym Seat System by Hussey Seating Company
 - B. Model: MAXAM26 Series Telescopic Gym Seats, adjustable row spacing in twoinch increments from 22 inches to 26 inches
 - C. MAXAM26 Series Telescopic Gym Seats Row Rise Spacing: 9 5/8"
 - D. Aisle Type: foot level aisles, front steps, and intermediate aisle steps.
 - E. Seat Type: 10" Courtside Collection
 - F. Seat color finish: manufacturers 15 standard colors for Courtside Collection
 - G. Seat design logos: up to 5 color combinations for seating design graphics and/ or school logos.
 - H. Rail Type: Self Storing Aisle Handrails and Self Storing End Rails
 - I. Rail color finish: As selected by architect from manufacturer's 15 standard colors
 - J. Operation: electrical power

Electrical Power System: Integral power with pendant controls, motion monitor, limit switches

K. Product Description/Criteria:

Bank Length:	72' – 6"
Aisle Widths:	4' – 6"
Number of Tiers:	6
Row Spacing(s):	26"
Row Rise:	9 5/8"
Net Capacity:	504

- L. Miscellaneous Product Accessories: Graphic Courtside Aisle Logos on all Courtside Aisle Seats and Full Graphic End Curtains
- M. Handicap Seating Provisions: Provide first tier modular recoverable Flex-rows per requirements of The American with Disabilities Act and as Indicated.
- N. Special Seating Graphics:
 - 1. Provide up to five different color seat modules to create a graphic pattern as indicated or approved.
 - 2. Full Graphic Aisle Logos on All Seat Modules located on the Aisleway.

2.2 Approval Consideration:

Manufacturers wishing to bid this project are required to have written approval from the Architect. Requests for approval must be submitted to the architect at least Ten (10) days prior to bid date. Manufacturers will be considered if in strict compliance with these Specifications. Proof of compliance and all deviations must be submitted with approval request in compliance with Section 01360.

2.3 Materials

- A. Lumber: ANSI/Voluntary Product 20, B & B Southern Pine
- B. Plywood: ANSI/Voluntary Product PS1, APA A-C Exterior Grade.
- C. Structural Steel Shapes, Plates and Bars: ASTM A 36.
- D. Uncoated Steel Strip (Non-Structural Components): ASTM A569, Commercial Quality, Hot-Rolled Strip.
- E. Uncoated Steel Strip (Structural Components): ASTM A570 Grade 33, 40, 45, or 50, Structural Quality, Hot-Rolled Strip.
- F. Uncoated Steel Strip (Structural Components): ASTM A607 Grade 45 or 50, High-Strength, Low Alloy, Hot-Rolled Strip.
- G. Galvanized Steel Strip: ASTM A653 Grade 40, zinc coated by the hot-dip process, structural quality.
- H. Structural Tubing: ASTM A500 Grade B, cold-formed.
- I. Polyethylene Plastic: ASTM D 1248, Type III, Class B; molded, color-pigmented, textured, impact-resistant, structural formulation; in color selected by Architect from manufacturer's standard colors.
- J. Fasteners: Vibration-proof, of size and material standard with manufacturer.
- 2.4 Understructure Fabrication
 - A. Frame System:

- 1. Wheels: Not less than 5" diameter by 1 1/4" with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit 3/8" diameter axles secured with E-type snap rings.
- 2. Lower Track: Continuous Positive Interglide System interlocks each adjacent CPI unit using an integral, continuous, anti-drift feature and through-bolted guide at front to prevent separation and misalignment. CPI units at end sections of powered banks and manual sections shall contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.
- 3. Slant Columns: High tensile steel, tubular shape.
- 4. Sway Bracing: High tensile steel members through-bolted to columns.
- Deck Stabilizer: High tensile steel member through-bolted to nose and riser at three locations per section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment. Incorporates multiple stops to allow field adjustment of row spacing.
- Deck Support: Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section.
- B. Deck System:
 - 1. Section Lengths: Each bank shall contain sections not to exceed 25'-6" in length with a minimum of two supporting frames per row, each section.
 - Nose beam and Rear Riser beam: Nose beam shall be continuously rollformed closed tubular shape of ASTM A653 grade 40, Riser beam shall be continuously roll-formed of ASTM A653 grade 40. Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly.
 - 3. Attachment: Through-Bolted fore/aft to deck stabilizers and frame cantilevers.
 - 4. Decking: 5/8", AC grade clear-top-coated tongue and groove Southern Yellow Pine of interior type with exterior glue, 5-ply, all plies with plugged crossbands, produced in accordance with National Bureau of Standards PS-1-97. Plywood shall be cut and installed with top, center and bottom ply grain-oriented from front of deck to rear of deck (nose beam to riser beam). Adjacent pieces shall be locked together with tongue and groove joint from front to rear of deck. Longest unsupported span: MAXAM 26, 21 ½" [546].
 - 5. Deck End Overhang: Not to exceed frame support by more than 5'-7".

2.5 Seating Fabrication

A. Plastic Seat System – Courtside Collection XC10 (10" seat):

Hussey Courtside Collection Series embodies the latest leading-edge innovations in linear telescopic seating modules. Courtside seats utilize a harmonious blend of advanced ergonomic principles, architecturally appealing design, safety, value and performance.

- Seat Modules: 18" long assembled, gas assisted injection-molded, high density, 100% recyclable HDPE (high density polyethylene) modules in monochromatic colors providing, dual textured scuff resistant 10" or 12" wide seat surface with ½" minimum interlock on seat and face. Unit structural tested to 600 lbs occupant load.
- B. 10" wide continuous comfort curve style bench seat
- C. Ergonomically contoured forward "waterfall" edge for enhanced spectator comfort and minimization of sensitive pressure point area, regardless of leg positioning.
- D. Fore & Aft contoured seat surface for uniform support and minimize high pressure points under the buttocks.
- E. Seat height ranges from deck to t/o seat range from 16-1/8" to 18-1/8"
- F. 21-1/2" clear foot space area, regardless of leg positioning
 - 1. Integrally molded end caps at aisle end locations for clean finished appearance.
 - 2. Integrally molded recess pockets to accept seat number and row letters.
 - Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.
- G. Seat Attachment: Each plastic seat module shall be securely anchored by a 12 ga steel clamp bracket that provides a steel-to-steel, through bolted attachment to the front nose beam of the bleacher. Attachment eliminates fore / aft movement of the seat module on the nose beam.
- H. Custom Signature Logo
 - 1. Factory or Dealer designed logo that incorporates school letters or graphical representation of school logo across the front of the bleachers.
 - 2. Logo is visible when the bleachers are in the stored position.
 - 3. Select up to five colors for maximum color contrast and creativity.

2.6 Shop Finishes

- A. Understructure: For rust resistance, steel understructure shall be finished on all surfaces with black "Dura-Coat" enamel. Understructure finish shall contain a silicone additive to improve scratch resistance of finish.
- B. Wear Surfaces: Surface subject to normal wear by spectators shall have a finish that does not wear to show different color underneath:
 - 1. Steel nosing and rear risers shall be pre-galvanized with a minimum spangle of G-60 zinc plating.
 - 2. Decking shall have use-surfaces to receive both a sealer coat and wearresistant high gloss clear urethane finish.
- C. Railings: Steel railings shall be finished with powder-coated semi gloss black.
- 2.7 Fastenings:
 - A. Welds: Must be performed by welders certified by AWS standards for the process employed.
 - B. Structural Connections: Secured by structural bolts with prevailing torque lock nuts, free-spinning nuts in combination with lock washers, or Riv-nuts in combination with lock washers.
- 2.8 Electrical Operation System:
 - A. Integral Power
 - 1. Default operation shall be with a removable pendant control unit which plugs into seating bank for tethered operator management of stop, start, forward, and reverse control of the power operation. Other modes of operation are optional.
 - B. PF1/2/3/4: Furnish and install Hussey PF(1/2/3/4), an integral automatic electro mechanical powered frame propulsion system, to open and close telescopic seating.
 - Electrical Seating Manufacturer shall provide all wiring within seating bank, including pendant control. Motors, housing, and wiring shall be installed and grounded in complete accord with the National Electrical Code. The control system shall operate at low voltage (24V). The electrical contractor shall perform all connections at and upstream of the equipment specified herein and ensure that supplied voltage drops no more than 4% below nominal where power connects thereto.
 - Each unit for PF(1/2/3/4) is driven by a 1/2 horsepower, 1725 RPM motor - 208V 3 Phase:
 - 1.) This 1.25 Service Factor motor runs on 208V at 60 Hz and draws a full load current of 1.8 amperes. The required power supply

shall be 3 asynchronous phases of 120 Volts each, plus neutral plus ground, each with 20 Amp capacity.

- 2.) This system shall be UL Listed in its entirety (motors, circuit protection, motor controls, user interface, enclosures, conductors and connectors all evaluated and approved for correct sizing and compatibility under maximum rated load on the motors) under UL Product Category FHJU, titled Electrical Drive and Controls for Folding and Telescopic Seating.
- Each pair of Powered Frames shall consist of output shaft gear reducer with [6 inch (152mm)] diameter x [4 inch (102mm)] wide wheels covered with non-marring [1/2 inch (13mm)] thick composite rubber, and operate the bleacher as follows:
 - PF1 Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 2 drive wheels. Max pull approx. 261 lbs [1161 N];
 - PF2 Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 4 drive wheels. Max pull approx. 261 lbs [1161 N].

2.9 Accessories

- A. Flex-Row: Provide first row modular recoverable seating units to be utilized by persons in wheelchairs and able-bodied persons. Each Flex-Row unit shall have an unlock handle for easy deployment if wheelchair or team seating access is needed. Unlock handle shall lock the bleacher seats into position when fully opened.
 - 1. Provide a black full-surround steel skirting with no more than 3/4" floor clearance for safety and improved aesthetics.
 - 2. Provide a black injection molded end cap for the nose beam for safety and improved aesthetics.
 - 3. Provide a mechanical positive lock when the Flex-Row system is in the open and used position.
 - 4. Flex-Row modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements and facility specific requirements. Flex-Row units are available in modular units from 2 to 7 seats wide as well as full section widths.
- B. Front Aisle Steps: Provide at each vertical aisle location front aisle step. Front steps shall engage with front row to prevent accidental separation or movement. Steps shall be fitted with four non-skid rubber feet each 1/2" [13] in diameter. Blow molded end caps shall have full radius on all four edges. Quantity and location as indicated.

- C. Non-Slip Tread: Provide at front edge of each aisle location an adhesive-backed abrasive non-slip tread surface.
- D. Foot Level Aisles: Provide deck level full width vertical aisles located as indicated.
- E. Intermediate Aisle Steps: Intermediate aisle steps shall be of boxed fully enclosed type construction. Blow molded end caps shall have full radius on all four edges. Step shall have adhesive-backed abrasive non-slip tread surface. Quantity and location as indicated.
- F. Auto Rotating, Self Storing Aisle Rails

Provide single pedestal mount handrails [34 inches (864mm)] high with terminating mid rail. Permanently attached handrail shall rotate in a permanently mounted socket for rail storage. Rail shall automatically rotate, lock in the use position, unlock and rotate back to the stowed position as the gym seats open and close. Ends of the handrail shall return to the post, and not extend away from it. *Rails requiring any human contact to close the bleachers are not acceptable.*

- G. Self-Storing End Rails: Provide steel self-storing 42" high above seat, end rail with tubular supports and intermediate members designed with 4" sphere
- H. Self Storing Vinyl End Curtains with Optional full graphics included.
- I. Custom Signature Logo:
 - Factory or Dealer designed logo that incorporates school letters or graphical representation of school logo across the front of the bleachers.
 - 1. Logo is visible when the bleachers are in the stored position.
 - Select up to five colors for maximum color contrast and creativity.
 - CourtSide Graphic Logo: Decorative graphic logo that is applied to the applied to the integrally molded end cap recess area of the CourtSide 10 XC seat module.
 - 1. Logo is approximately [4.7 inches (119 mm)] x [3.5 inches (89 mm)] with full color.
 - 2. Logo is trimmed to a precise custom cut shape with two mounting holes.
- J. Safety Accessories: Provide the following safety features:
 - Coin Round or Roll all edges of exposed metal on top and underneath Bleacher to eliminate sharp edges. Provide safety ease edges, coined edges, or rounded edges for the bleacher understructure components as follows. Diagonal or X braces and deck support or deck stabilizers.

Systems provided with sharp edges or corners, to be rounded off in the field and field painted.

- 2. Provide plastic end cap on nose metal at Bank ends to close off edges to prevent spectator injury.
- 3. Provide plastic end cap on back of deck supports on 1st 7 Rows to prevent spectator injury.
- On 1st Row, provide front and side skirt boards anywhere there is an exposed end to prevent players/balls from sliding underneath the 1st Row.
- Provide metal cover over motor chains and wheels to protect chains from debris and provide a safety switch that if cover is taken off the power system will not work.
- 6. Provide metal end deck cover on each row to cover exposed edge of plywood at the ends of the bleachers.
- 7. Powered frames systems without a metal protective housing, covering drive chain and drive wheels are not permitted under this specification

3.0 - EXECUTION

- 3.1 Examination
 - A. Verification of Conditions: Verify area to receive telescoping gym seats are free of impediments interfering with installation and condition of installation substrates are acceptable to receive telescoping gym seats in accordance with telescoping gym seats manufacturer's recommendations. Do not commence installation until conditions are satisfactory.

3.2 Installation

- A. Manufacturer's Recommendations: Comply with telescoping gym seats manufacturer's recommendations for product installation requirements.
- B. General: Manufacturer's Certified Installers to install telescoping gym seats in accordance with manufacturer's installation instructions and final shop drawings. Provide accessories, anchors, fasteners, inserts and other items for installation of telescoping gym seats and for permanent attachment to adjoining construction. Cost of storage shall be borne by the General Contractor if the facility is not in satisfactory order when bleachers arrive.

3.3 Adjustment and Cleaning

- A. Adjustment: After installation completion, test and adjust each telescoping gym seats assembly to operate in compliance with manufacturer's operations manual.
- B. Cleaning: Clean installed telescoping gym seats on both exposed and semiexposed surfaces. Touch-up finishes to restore damage or soiled surfaces.

- 3.4 Protection
 - A. General: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer to ensure telescoping gym seats are without damage or deterioration at time of substantial completion.

PRE-ENGINEERED STEEL BUILDING - SECTION 13100

<u> 1.0 - GENERAL</u>

1.1 <u>Scope</u>

The pre-engineered steel building package shall consist of primary and secondary structure, metal roof panel or deck, exterior wall cover, fascia panel, trim and flashing, closures, caulking, fasteners and other miscellaneous metal building components or accessory items as shown or called for in the drawings or specifications and as required.

1.2 Related Sections

- A. Section 07610 Standing Seam Roof and Sheet Metal System
- B. Section 08110 Hollow Metal Doors and Frames
- 1.3 Qualifications
 - A. A complete structural analysis of the design is to be made to demonstrate that requirement of design and load criteria are met.
 - B. A copy of manufacturer's calculations and analysis shall be furnished to the Architect.
 - C. Metal building manufacturer shall be accredited by the International Accreditation Services' IAS Accreditation for Inspection Programs for Manufacturers of Metal Building Systems (AC472). Metal Building Manufacturer shall be currently enrolled in an IAS accreditation program and shall maintain such throughout the course of the project.
 - D. Metal building shall be designed in accordance with "The Metal Building Manufacturers Association's Design Practice Manual."
 - E. The metal building design engineer is responsible for the complete design of the metal building system.
- 1.4 Submittals
 - A. Shop Drawings for approval. Drawings and design analysis shall bear the seal of a registered professional engineer registered in the State of Alabama. Submittal shall include layout of all members, connections, and accessories and associated details for erection.
 - B. Documentation of manufacturer's current (up-to-date) IAS certification shall be submitted to the Architect. If accreditation expires during the course of the project renewed certificate shall be submitted as well.
 - C. Record or certificate of erector training for metal building system being erected.
 - D. Building exterior components samples.
 - E. Color samples for approval.

1.5 Warranties

All materials and workmanship covered by this section shall be guaranteed from date of final acceptance of the Contract, or from occupancy of the building whichever is earlier.

- A. <u>Wall Paint Warranty</u>
 All wall panels shall be guaranteed for a period of ten (10) years against chalk, fade, crack, check, blister or peel.
- B. <u>Roof Paint Warranty</u> All roof panels shall be guaranteed for a period of twenty (20) years against chalk, fade, crack, check, blister, or peel.
- C. Standard manufacturer's roofing guarantees (or warranties) which contain language regarding the governing of the guarantee (or warranty) 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 (or warranties).
- 1.6 General
 - A. All components including, but not limited to the following will be furnished and installed for the complete steel structural framework: anchor bolts, wall and roof panels, downspouts, gutters, fascias, insulation, all necessary closures, trims, flashing and fasteners to provide a weather proof building, and miscellaneous accessories as specified.
 - B. All steel shall be new, clean and straight. Welding shall be done by qualified operators and the specifications of the American Welding Society adhered to. Workmanship on all parts will be equal to that of best modern shop practices.
 - C. Walk-thru doors and hardware furnished and installed under Hollow Metal Doors and Frames Section 08110 And Finish Hardware Section 08710.
 - D. Rolling Service Doors Section 08360.

2.0 - PRODUCT

- 2.1 <u>General</u>
 - A. All structural mill sections or welded up plate sections shall be designed in accordance with the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", latest edition.
 - B. All Cold-formed steel structural members shall be designed in accordance with the AISI "Specification for the Design of Cold-formed Steel Structural Members", latest edition.
- 2.2 Design Loads
 - A. The design loads for the building shall be, in addition to their own dead load, the live, wind, snow and seismic loads required of the following as specified:
 - 1. 2021 International Building Code.
 - 2. Low Rise Building Systems Manual, by the Metal Building Manufacturers

Association.

- B. The building components shall be designed to meet the most severe conditions of load combinations set by the specified building code, but in no case be less than that produced by the following load combinations:
 - 1. Building dead load plus roof live load (or snow).
 - 2. Building dead load plus wind load.
 - 3. Building dead load plus wind load plus one-half roof snow load.
 - 4. Building dead load plus roof snow load plus one-half wind load.
- C. Roof live and snow loads shall be applied on the horizontal roof projection. Wind loads shall be assumed to act horizontally and shall be applied as pressure and suction perpendicular to the building surface.
- D. Design load requirements shall be determined by local conditions, applicable codes, building end use, etc. Application of design loads shall be in accordance with the Design Practices sections of the Metal Building Manufacturers Association (MBMA) Building Systems Manual, unless specified otherwise. <u>NOTE</u>: See all drawings for additional point loading on the roof structure (including but not limited to roof top mechanical units, hanging equipment loads, continuous heavy piping loads, etc.).
- E. Minimum design collateral loads supported on or hung from the roof structure shall be as follows:

Minimum Design Collateral Load (MDCL)...... 10 psf

These collateral loads shall be applied in addition to self-weight of building frame, roof decking and roof covering weights.

- F. Deflection Limits:
 - Roof Purlins and Rafters: DL Span/360, LL Span/360, TL Span/240.
 - Girts Supporting Metal Panels: Horizontal deflection Span/120.
 - Overall Building Drift: H/200 where "H" is the building eave height.
 - Note specific deflection requirements and expansion joints noted on drawings.
- 2.3 Primary Framing Steel
 - A. Steel for hot-rolled structural sections shall conform to the requirements of ASTM specification A 36.
 - B. Steel for all built-up sections shall meet as applicable the physical and chemical properties of ASTM A 572 modified to 55,000 psi minimum yield and 70,000 psi minimum tensile strength, or ASTM A 607-85, Grade 55, or ASTM A 570-88, Grade 55.
 - C. Steel for all endwall "C" sections shall meet the physical and chemical properties of ASTM A 570-88, Grade 55.
 - D. Rigid Frame: All rigid frames shall be welded, built-up "I" sections. The columns shall be straight or sloped with a minimum depth of 12" for primary frame members. Bases of frames are to be pinned.
 - E. Endwall Frames: All endwall roof beams and endwall columns shall be coldformed "C" sections, mill-rolled sections, or built-up "I" sections as required for

future bay addition.

- F. Plates, Stiffeners, etc.: All base plates, splice plates, cap plates, and stiffeners shall be factory welded into place on the structural members.
- G. Bolt Holes, etc: All base plates, splice plates and flanges shall be shop fabricated to include bolt connection holes. Webs shall be shop fabricated to include cable brace or rod brace holes and flange brace holes.
- 2.4 Secondary Framing Steel
 - A. Steel used to form purlins, girts, eave struts and "C" sections shall meet the physical and chemical properties of ASTM A 570-88, Grade 55.
 - B. Steel used to form zinc-coated (galvanized) rolling service door frames shall meet the physical and chemical properties of ASTM A 446-87, Grade D and G 90 Coating designation as described in ASTM A 525-87.
 - C. Purlins and Girts: Purlins and girts shall be cold-formed "Z" or "C" sections with stiffened flanges. They shall be prepunched at the factory to provide for field bolting to the primary framing. They shall be simple or continuous span as required by design.
 - D. Bracing Struts: Provide bracing struts of round HSS or pipe sections sized as required to transfer lateral forces into primary structural frame system.
 - E. Eave Struts: Eave Struts shall be unequal flange, cold-formed "C" sections.
 - F. Base Angle: A base member will be supplied by which the base of the wall covering may be attached to the perimeter of the slab. This member shall be secured to the concrete slab with concrete anchors.
 - G. Provide attachment and support framing for wall mounted gymnasium equipment.
- 2.5 Bracing
 - A. Diagonal Bracing: Diagonal bracing in the roof shall be used to resolve horizontal loads (wind, seismic, crane, etc.) from the roof structure into the longitudinal bracing frames or transverse rigid frames. This bracing will be furnished to length and equipped with bevel washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors.
 - B. Flange Braces: The compression flange of all primary framing shall be braced laterally with angles connecting to the webs of purlins or girts so that the flange compressive stress is within allowable limits for any combination of loadings.
 - C. Longitudinal and Special Bracing: **Diagonal bracing is not permitted in the sidewall**, a rigid frame type portal with pinned bases must be used. Coordinate load path of sidewall bracing frames with load path of wind/seismic bracing in the roof. Provide additional bracing as required to transfer all horizontal loads into the primary structural system.
 - D. Coordinate trades with locations of bracing. Bracing shall not be removed or cut to facilitate installation of other trades unless approved in writing by the metal building design engineer.

2.6 <u>Wall Panel Material</u>

Panel material as specified shall be 24 gauge zinc-coated (galvanized) steel, coating designation G 90, conforming to the requirements of ASTM A 446 Grade D. Minimum yield stress shall be 50,000 psi.

2.7 <u>Connections</u>

- A. All field connections shall be bolted (unless otherwise noted).
- B. All shop connections shall be welded using either submerged or shielded arc process, and welding shall be in accordance with the applicable sections, relating to design requirements and allowable stresses, of the latest editions of the American Welding Society "Structural Welding Code."
- C. Metal building designer shall size anchor rods and provide details for required anchorage to the foundations.

2.8 Roof Covering

- A. The roof system shall be provided under Section 07610.
- B. The roof system shall carry a UL wind uplift <u>Class 90 rating</u>. Comply with FM I-90 and the 2021 International Building Code.
- C. Purlins shall be insulated so as to eliminate "thermal short circuits" between purlins and roof panels, with continuous thermal spacer blocks.
- 2.9 Wall Covering

The Exterior wall covering shall be first quality 24 gauge galvanized steel architectural type panels (A.S.T.M. Galvanized Specifications). Panels will be precision roll-formed 36" panels with ribs at 12" o.c. The interior liner panels shall be minimum 3/4" thick 24 gauge - panel profile to be approved by architect.

2.10 Panel Fasteners

Panel fasteners will be galvanized self-tapping hex head screws. A self sealing washer will be used under the head of all panel fasteners. Galvanized screws will be used on the sidewalls of all colored buildings. Fasteners shall be pre-finished to match wall panel color.

2.11 Weather Sealing

Α.

<u>Sealant</u>

Sealant to be used in all end panel laps on roofs and all other locations recommended by the manufacturer or required for weathertightness.

B. Weather Seal Strips

Sealer strips to be moulded from first grade high quality polyurethane to ensure long life.

2.12 <u>Paint</u>

Α.

Exterior Paint and Interior Paint (For Exterior Wall Panels and , Interior Liner Panels)

A 70% minimum Kynar 500 finish shall be applied over galvanized steel and shall be given a chemical conversion treatment prior to painting. See paragraph 1.4 for Warranty requirements. Color shall be approved by the Architect to match existing.

- B. <u>Structural Paint</u>
 - 1. All fabricated structural steel to be shot blast cleaned to remove loose rust, mill scale, etc. After inspection for accuracy of fabrication, it shall receive one shop coat of manufacturer's standard gray finish.
 - 2. Any field touch-up necessary shall be the responsibility of the erector.
- 2.13 <u>Gutters, Downspouts, and Flashings</u>
 - A. <u>Gutters and Downspouts</u>: Gutters and downspouts to be furnished by Metal Building Manufacturer. Members to be fabricated from galvanized steel with supporting brackets properly spaced. Gutters shall be 24 gauge and downspouts 28 gauge. Finish shall match roof/wall panels.
 - B. <u>Flashings</u>: Roof, gables and eaves will be flashed with 26 gauge galvanized fascia trim. Corners of the building will be provided with 26 gauge galvanized steel corner trim. Door, window and sill trim will be provided in 26 gauge galvanized steel. Painted galvanized steel flashings will be fabricated from prefinished steel using the same paint specifications as wall and roof sheets.
- 2.14 Glass Fiber Insulation

Glass Fiber Insulation to be fabricated from first grade high quality glass fiber blanket and faced with white vinyl reinforced polyester film. Insulation shall have Underwriter's Label. Glass fiber insulation shall be .60 density - 6" thick - 25 flame spread - "R" value of R19. All insulation shall be protected and maintained dry. Wet Insulation shall be rejected.

- 2.15 <u>Framed Openings</u> This contractor to provide framed openings with prefinished flashing to accommodate mechanical equipment such as louvers, grilles, piping, conduit furnished by other trades.
- 2.16 Roof and Wall Penetrations

All roof penetrations shall be flashed by building manufacturer/installer. All circular roof penetrations shall be made of a one piece construction from an EPDM membrane with aluminum base. Roof curbs shall be provided by building manufacturer/installer.

3.0 - EXECUTION

3.1 <u>Erection</u>

All components herein specified and indicated shall be furnished and erected in accordance with details and manufacturer's instructions. Erection shall be performed by a qualified erector who has attended training by the building manufacturer of the system being installed using proper tools and equipment. It shall be the responsibility of the erector to comply with all applicable legal and safety requirements. It shall further be the responsibility of the erector to determine and provide any and all temporary bracing, bridging, blocking, shoring, and/or securing of components, etc. as required for stability during the entire erection process.

3.2 Coordination

All components herein specified and indicated shall be coordinated with other trades that effect components including but not limited to the following:

Concrete – Section 03300
- Standing Seam Metal Roofing Section 07610
 Hollow Metal Doors and Frames Section 08110
- Finish Hardware Section 08710
- Mechanical Division 15
- Electrical Division 16

END OF SECTION

NEW GYMNASIUM FOR HAMILTON MIDDLE SCHOOL MARION COUNTY BOARD OF EDUCATION

<u>Mechanical</u>

Section 15010 - Basic Mechanical Requirements Section 15050 - Basic Mechanical Materials and Methods Section 15145 - Hangers and Supports Section 15183 - Refrigerant Piping Section 15250 - Mechanical Insulation Section 15820 - Duct Accessories Section 15853 - Power Ventilators Section 15891 - Metal Ductwork Section 15932 - Air Outlets and Inlets Section 15990 - Testing, Adjusting and Balancing

Plumbing

Section 15010 - Basic Mechanical Requirements Section 15050 - Basic Mechanical Materials and Methods Section 15100 - Valves Section 15135 - Meters and Gages Section 15145 - Hangers and Supports Section 15150 - Sanitary Waste and Vent Piping Section 15250 - Mechanical Insulation Section 15411 - Water Distribution Piping Section 15430 - Plumbing Specialties Section 15440 - Plumbing Fixtures

Fire Protection

Section 15915 - Fire-Suppression Piping

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CONSULTING ENGINEERS

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BASIC MECHANICAL REQUIREMENTS - SECTION 15010

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 and the other sections of Division 15.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT," for factory-installed motors, controllers, accessories, and connections.
 - Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS," for materials and methods common to the remainder of Division 15, plus general related specifications including:
 - a. Access to mechanical installations.
 - b. Excavation for mechanical installations within the building boundaries, and from building to utilities connections.

1.3 <u>SUBMITTALS</u>

- A. General: Follow the procedures specified in Division 1 Section "SUBMITTALS."
- B. Increase, by the quantity listed below, the number of mechanical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Mechanical Consulting Engineer.
 - 1. Shop Drawings Initial Submittal: 1 additional blue- or black-line prints.
 - 2. Shop Drawings Final Submittal: 1 additional blue- or black-line prints.
 - 3. Product Data: 1 additional copy of each item.
 - 4. Samples: 1 addition as set.
- C. Additional copies may be required by individual sections of these Specifications.

1.4 <u>RECORD DOCUMENTS</u>

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, indicate the following installed conditions:
 - 1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
 - 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 - Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 Approved substitutions, Contract Modifications, and actual equipment and materials installed.
 - 5. Contract Modifications, actual equipment and materials installed.

1.5 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems,

materials, and equipment. Comply with the following requirements:

- 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
- 2. Verify all dimensions by field measurements.
- 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
- 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- 5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
- 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
- 7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- 8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
- 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
- 10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- 11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS."
- 12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:
 - 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - 1. Uncover Work to provide for installation of ill-timed Work.
 - 2. Remove and replace defective Work.
 - 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 - 4. Remove samples of installed Work as specified for testing.
 - 5. Install equipment and materials in existing structures.
 - 6. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing

fixtures and trim, and other mechanical items made obsolete by the new Work.

- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 - 1. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - 2. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION 15010

BASIC MECHANICAL MATERIALS AND METHODS - SECTION 15050

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 <u>SUMMARY</u>

- A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Nonshrink grout for equipment installations.
 - 9. Field-fabricated metal and wood equipment supports.
 - 10. Installation requirements common to equipment specification sections.
 - 11. Mechanical demolition.
 - 12. Cutting and patching.
 - 13. Touchup painting and finishing.
- B. Pipe and pipe fitting materials are specified in Division 15 piping system Sections.

1.3 **DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.

- 2. CPVC: Chlorinated polyvinyl chloride plastic.
- 3. NP: Nylon plastic.
- 4. PE: Polyethylene plastic.
- 5. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. CR: Chlorosulfonated polyethylene synthetic rubber.
 - 2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 <u>SUBMITTALS</u>

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- C. Coordination Drawings: For access panel and door locations.
- D. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 - 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 - 2. Clearances for installing and maintaining insulation.
 - 3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 - 4. Equipment and accessory service connections and support details.
 - 5. Exterior wall and foundation penetrations.
 - 6. Fire-rated wall and floor penetrations.
 - 7. Sizes and location of required concrete pads and bases.
 - 8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
 - 9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 - 10. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.
- E. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Dielectric Unions:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Eclipse, Inc.; Rockford-Eclipse Div.
 - d. Epco Sales Inc.
 - e. Hart Industries International, Inc.

- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Industries, Inc.; Wilkins Div.
- 2. Dielectric Flanges:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Epco Sales Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- 3. Dielectric-Flange Insulating Kits:
 - a. Calpico, Inc.
 - b. Central Plastics Co.
- 4. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- 5. Dielectric Nipples:
 - a. Grinnell Corp.; Grinnell Supply Sales Co.
 - b. Perfection Corp.
 - c. Victaulic Co. of America.
- 6. Metal, Flexible Connectors:
 - a. ANAMET Industrial, Inc.
 - b. Central Sprink, Inc.
 - c. Flexicraft Industries.
 - d. Flex-Weld, Inc.
 - e. Grinnell Corp.; Grinnell Supply Sales Co.
 - f. Hyspan Precision Products, Inc.
 - g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
 - h. Mercer Rubber Co.
 - i. Metraflex Co.
 - j. Proco Products, Inc.
 - k. Uniflex, Inc.
- 7. Rubber, Flexible Connectors:
 - a. General Rubber Corp.
 - b. Mercer Rubber Co.
 - c. Metraflex Co.
 - d. Proco Products, Inc.
 - e. Red Valve Co., Inc.
 - f. Uniflex, Inc.
- 8. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.
 - 1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
- F. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.

- 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
- 3. Gaskets: Rubber.
- 4. Bolts and Nuts: AWWA C111.
- 5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- F. 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.
 - 1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
 - 1. 2-Inch NPS and Smaller: Threaded.
 - 2. 2-1/2-Inch NPS and Larger: Flanged.
 - 3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose. Do not use for potable water
- D. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose. Do not use for potable water.

E. Rubber, Flexible Connectors: CR or EPDM elastomer rubber construction, with multiple plies of NP fabric, molded and cured in hydraulic presses. Include 125-psig minimum working-pressure rating at 220 deg F. Units may be straight or elbow type, unless otherwise indicated. Do not use for potable water unless units comply with NSF61.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
 - 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 - 2. OD: Completely cover opening.
 - 3. Cast Brass: One piece, with set screw.
 - a. Finish: Polished chrome-plate.
 - 4. Cast Brass: Split casting, with concealed hinge and set screw.
 - a. Finish: Polished chrome-plate.
 - 5. Stamped Steel: One piece, with set screw and chrome-plated finish.
 - 6. Stamped Steel: One piece, with spring clips and chrome-plated finish.
 - 7. Stamped Steel: Split plate, with concealed hinge, set screw, and chrome-plated finish.
 - 8. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
 - 9. Stamped Steel: Split plate, with exposed-rivet hinge, set screw, and chrome-plated finish.
 - 10. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
 - 11. Cast-Iron Floor Plate: One-piece casting.

2.8 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

- 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
- 2. Location: Accessible and visible location.
- C. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap on, colorcoded, complying with ASME A13.1.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, colorcoded, pressure-sensitive vinyl, complying with ASME A13.1.
- E. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:
 - 1. Green: Cold air.
 - 2. Yellow: Hot air.
 - 3. Yellow/Green or Green: Supply air.
 - 4. Blue: Exhaust, outside, return, and mixed air.
 - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 - 6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.
 - d. Duct destination.
 - e. Design cubic feet per meter.
- F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resinlaminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
 - 1. Fabricate in sizes required for message.
 - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 - 3. Punch for mechanical fastening.
 - 4. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches long; 1/8 inch for larger units.
 - 5 Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
- G. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.
 - 3. Yellow/Green: Combination cooling and heating equipment and components.
 - 4. Brown: Energy reclamation equipment and components.
 - 5. Blue: Equipment and components that do not meet any criteria above.
 - 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
 - 7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.

- 8. Size: Approximate 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.
- H. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
 - Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

2.9 <u>GROUT</u>

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
 - 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psig, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 15 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at slope in accordance with related codes.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.

- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
 - 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE removable sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Build sleeves into new walls and slabs as work progresses.
 - 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsumboard partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - 1. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 - 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 - 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

- R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
 - 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - 6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 - 7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
 - 8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Pressure Piping: ASTM D 2672.
 - c. PVC Nonpressure Piping: ASTM D 2855.

- W. Piping Connections: Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 - 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
 - 2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
 - c. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
 - g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.
 - 1. Lettering Size: Minimum 1/4-inch- high lettering for name of unit if viewing distance is less than 24 inches, 1/2-inch- high lettering for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
 - 1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.
- D. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.

3.4 PAINTING AND FINISHING

- A. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
 - 5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- B. Do not paint piping specialties with factory-applied finish.
- C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 6 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig, 28-day compressive-strength concrete and reinforcement.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.8 <u>DEMOLITION</u>

- A. Disconnect, demolish, and remove Work specified in Division 15 Sections.
- B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.
- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING - ROOF/CURB PENETRATIONS

A. The HVAC contractor shall not cut or penetrate the roof. Roofing contractor to make all roof penetrations and provide/install all curbs. Coordinate curb and roof penetrations needed with roofing contractor. Refer to roof curb specifications.

3.10 CUTTING AND PATCHING – GENERAL

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.11 <u>GROUTING</u>

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.

- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

PART 4 - HVAC EQUIPMENT

4.1 EXHAUST FANS

- A. Description: Fan shall be ceiling mounted, direct driven, centrifugal exhaust fan.
- B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.
- C. Construction: The fan wheel housing and integral outlet duct shall be injection molded from a specially engineered resin exceeding UL requirements for smoke and heat generation.
 - 1. The outlet duct shall have provision for an aluminum backdraft damper with continuous aluminum hinge rod.
 - 2. The inlet box shall be minimum 22 gauge galvanized steel.
 - 3. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet.
 - 4. A field wiring compartment with receptacle shall be standard.
 - 5. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided.
 - 6. A white, high impact styrene injection molded grill shall be provided as standard. Unit shall be designed with provision for field conversion from ceiling to in-line.
 - 7. Unit shall be shipped in ISTA certified transit tested packaging.
- D. Wheel: 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.
- E. Motor: 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.

4.2 REFRIGERANT PIPING AND ACCESSORIES

A. General: Sized and installed in accordance with compressor manufacturer's recommendations. Material shall be soft copper. Joints, fitting, etc. shall be in accordance with manufacturer's recommendations.

4.3 HVAC EQUIPMENT

A. HVAC equipment shall be in accordance with the manufacturer's standard equipment as listed and scheduled on the plans.

4.4 WARRANTIES

A. Warranties shall begin at date of substantial completion. All compressors shall include minimum of five year warranty. One year warranty for labor, parts, units, etc. is required for all equipment.

END OF SECTION 15050

HANGERS AND SUPPORTS - SECTION 15145

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 **DEFINITIONS**

A. Terminology used in this Section is defined in MSS SP-90.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of hanger and support.
- C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.
- D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- E. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.
- F. Licensed Engineer's hanger and support installation report specified in the "Field Quality Control" Article.

1.5 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators according to AWS D1.1 "Structural Welding Code--Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
- C. NFPA Compliance: Comply with NFPA 13 for hangers and supports used as components of fire protection systems.

- D. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.
 - 1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

- A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.
 - 1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
 - 2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Thermal-Hanger Shield Inserts: 100-psi average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

2.2 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36, steel plates, shapes, and bars, black and galvanized.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.
- C. Washers: ASTM F 844, steel, plain, flat washers.
- D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.
 - 1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Water: Potable.
 - 4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in the Section specifying the equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments

as required to properly support piping from building structure.

- B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.
- C. Install supports with maximum spacings complying with MSS SP-69.
- D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
- E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.
- F. Install concrete inserts in new construction prior to placing concrete.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- I. Support fire protection systems piping independent of other piping.
- J. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.
- M. Insulated Piping: Comply with the following installation requirements.
 - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
 - 2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
 - 3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees and have dimensions in inches not less than the following:

LENGTH	THICKNESS
(Inches)	(Inches)
12	0.048
12	0.060
18	0.060
24	0.075
24	0.105
	LENGTH <u>(Inches)</u> 12 12 18 24 24 24

4. Pipes 8 Inches and Larger: Include wood inserts.

- 5. Insert Material: Length at least as long as the protective shield.
- 6. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.
- B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizingrepair paint to comply with ASTM A 780.

END OF SECTION 15145

REFRIGERANT PIPING - SECTION 15183

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 refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
 - 2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
 - 3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:
 - 1. Thermostatic expansion valves.
 - 2. Solenoid valves.
 - 3. Hot-gas bypass valves.
 - 4. Filter dryers.
 - 5. Strainers.
 - 6. Pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 - 1. Shop Drawing Scale: 1/4 inch equals 1 foot.
 - 2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.8 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.9 <u>COORDINATION</u>

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07720 "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L or ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; Type, Grade, and wall thickness as selected in Part 3 piping applications articles.
- B. Wrought-Steel Fittings: ASTM A 234/A 234M, for welded joints.
- C. Steel Flanges and Flanged Fittings: ASME B16.5, steel, including bolts, nuts, and gaskets, bevel-welded end connection, and raised face.
- D. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- E. Flanged Unions:
 - 1. Body: Forged-steel flanges for NPS 1 to NPS 1-1/2 (DN 25 to DN 40) and ductile iron for NPS 2 to NPS 3 (DN 50 to DN 80). Apply rust-resistant finish at factory.
 - 2. Gasket: Fiber asbestos free.
 - 3. Fasteners: Four plated-steel bolts, with silicon bronze nuts. Apply rust-resistant finish at factory.
 - 4. End Connections: Brass tailpiece adapters for solder-end connections to copper tubing.
 - 5. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7inch- (180-mm-) long assembly.
 - 6. Pressure Rating: Factory test at minimum 400 psig (2760 kPa).
 - 7. Maximum Operating Temperature: 330 deg F (165 deg C).
- F. Flexible Connectors:
 - 1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
 - 2. End Connections:
 - a. NPS 2 (DN 50) and Smaller: With threaded-end connections.
 - b. NPS 2-1/2 (DN 65) and Larger: With flanged-end connections.
 - 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7inch- (180-mm-) long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.3 VALVES AND SPECIALTIES

- A. Diaphragm Packless Valves:
 - 1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 - 2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 - 3. Operator: Rising stem and hand wheel.
 - 4. Seat: Nylon.
 - 5. End Connections: Socket, union, or flanged.
 - 6. Working Pressure Rating: 500 psig (3450 kPa).
 - 7. Maximum Operating Temperature: 275 deg F (135 deg C).
- B. Packed-Angle Valves:

- 1. Body and Bonnet: Forged brass or cast bronze.
- 2. Packing: Molded stem, back seating, and replaceable under pressure.
- 3. Operator: Rising stem.
- 4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
- 5. Seal Cap: Forged-brass or valox hex cap.
- 6. End Connections: Socket, union, threaded, or flanged.
- 7. Working Pressure Rating: 500 psig (3450 kPa).
- 8. Maximum Operating Temperature: 275 deg F (135 deg C).
- C. Check Valves:
 - 1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
 - 2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
 - 3. Piston: Removable polytetrafluoroethylene seat.
 - 4. Closing Spring: Stainless steel.
 - 5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
 - 6. End Connections: Socket, union, threaded, or flanged.
 - 7. Maximum Opening Pressure: 0.50 psig (3.4 kPa).
 - 8. Working Pressure Rating: 500 psig (3450 kPa).
 - 9. Maximum Operating Temperature: 275 deg F (135 deg C).
- D. Service Valves:
 - 1. Body: Forged brass with brass cap including key end to remove core.
 - 2. Core: Removable ball-type check valve with stainless-steel spring.
 - 3. Seat: Polytetrafluoroethylene.
 - 4. End Connections: Copper spring.
 - 5. Working Pressure Rating: 500 psig (3450 kPa).
- E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
 - 1. Body and Bonnet: Plated steel.
 - 2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - 3. Seat: Polytetrafluoroethylene.
 - 4. End Connections: Threaded.
 - 5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and ac coil.
 - 6. Working Pressure Rating: 400 psig (2760 kPa).
 - 7. Maximum Operating Temperature: 240 deg F (116 deg C).
 - 8. Manual operator.
- F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - 1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 - 2. Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Seat Disc: Polytetrafluoroethylene.
 - 4. End Connections: Threaded.
 - 5. Working Pressure Rating: 400 psig (2760 kPa).
 - 6. Maximum Operating Temperature: 240 deg F (116 deg C).
- G. Thermostatic Expansion Valves: Comply with ARI 750.
 - 1. Body, Bonnet, and Seal Cap: Forged brass or steel.
 - 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.

- 3. Packing and Gaskets: Non-asbestos.
- 4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
- 5. Suction Temperature: 40 deg F.
- 6. Superheat: Adjustable.
- 7. Reverse-flow option (for heat-pump applications).
- 8. End Connections: Socket, flare, or threaded union.
- 9. Working Pressure Rating: 700 psig.
- H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
 - 1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
 - 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Packing and Gaskets: Non-asbestos.
 - 4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - 5. Seat: Polytetrafluoroethylene.
 - 6. Equalizer: Internal.
 - 7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and ac coil.
 - 8. End Connections: Socket.
 - 9. Throttling Range: Maximum 5 psig (34 kPa).
 - 10. Working Pressure Rating: 500 psig (3450 kPa).
 - 11. Maximum Operating Temperature: 240 deg F (116 deg C).
- I. Straight-Type Strainers:
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. Screen: 100-mesh stainless steel.
 - 3. End Connections: Socket or flare.
 - 4. Working Pressure Rating: 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 275 deg F (135 deg C).
- J. Angle-Type Strainers:
 - 1. Body: Forged brass or cast bronze.
 - 2. Drain Plug: Brass hex plug.
 - 3. Screen: 100-mesh monel.
 - 4. End Connections: Socket or flare.
 - 5. Working Pressure Rating: 500 psig (3450 kPa).
 - 6. Maximum Operating Temperature: 275 deg F (135 deg C).
- K. Moisture/Liquid Indicators:
 - 1. Body: Forged brass.
 - 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 - 3. Indicator: Color coded to show moisture content in ppm.
 - 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 - 5. End Connections: Socket or flare.
 - 6. Working Pressure Rating: 500 psig (3450 kPa).
 - 7. Maximum Operating Temperature: 240 deg F (116 deg C).
- L. Replaceable-Core Filter Dryers: Comply with ARI 730.
 - 1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.

- 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
- 3. Desiccant Media: Activated alumina.
- 4. Designed for reverse flow (for heat-pump applications).
- 5. End Connections: Socket.
- 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
- 7. Maximum Pressure Loss: 2 psig.
- 8. Rated Flow: Based upon HVAC tons of refrigeration.
- 9. Working Pressure Rating: 500 psig (3450 kPa).
- 10. Maximum Operating Temperature: 240 deg F (116 deg C).
- M. Permanent Filter Dryers: Comply with ARI 730.
 - 1. Body and Cover: Painted-steel shell.
 - 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 - 3. Desiccant Media: Activated alumina.
 - 4. Designed for reverse flow (for heat-pump applications).
 - 5. End Connections: Socket.
 - 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 - 7. Maximum Pressure Loss: 2 psig.
 - 8. Rated Flow: Based upon HVAC tons of refrigeration.
 - 9. Working Pressure Rating: 500 psig (3450 kPa).
 - 10. Maximum Operating Temperature: 240 deg F (116 deg C).
- N. Mufflers:
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. End Connections: Socket or flare.
 - 3. Working Pressure Rating: 500 psig (3450 kPa).
 - 4. Maximum Operating Temperature: 275 deg F (135 deg C).
- O. Receivers: Comply with ARI 495.
 - 1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - 2. Comply with UL 207; listed and labeled by an NRTL.
 - 3. Body: Welded steel with corrosion-resistant coating.
 - 4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
 - 5. End Connections: Socket or threaded.
 - 6. Working Pressure Rating: 500 psig (3450 kPa).
 - 7. Maximum Operating Temperature: 275 deg F (135 deg C).
- P. Liquid Accumulators: Comply with ARI 495.
 - 1. Body: Welded steel with corrosion-resistant coating.
 - 2. End Connections: Socket or threaded.
 - 3. Working Pressure Rating: 500 psig (3450 kPa).
 - 4. Maximum Operating Temperature: 275 deg F (135 deg C).

2.4 <u>REFRIGERANTS</u>

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Atofina Chemicals, Inc.
 - 2. DuPont Company; Fluorochemicals Div.
 - 3. Honeywell, Inc.; Genetron Refrigerants.
 - 4. INEOS Fluor Americas LLC.
- C. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Suction Lines NPS 3-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- C. Suction Lines NPS 4 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with soldered joints.
- D. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- E. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications:
 - 1. NPS 5/8 and Smaller: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
 - 2. NPS 3/4 to NPS 1 and Smaller: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
 - 3. NPS 1-1/4 (DN 32) and Smaller: Copper, Type ACR, drawn-temper tubing and wroughtcopper fittings with 95-5 tin-antimony soldered joints.
 - 4. NPS 1-1/2 to NPS 2: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.
- F. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications NPS 2 to NPS 4 (DN 50 to DN 100): Schedule 40, black-steel and wrought-steel fittings with welded joints.
- G. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- H. Safety-Relief-Valve Discharge Piping: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- I. Safety-Relief-Valve Discharge Piping:
 - 1. NPS 5/8 and Smaller: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
 - 2. NPS 3/4 to NPS 1 and Smaller: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
 - 3. NPS 1-1/4 and Smaller: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

- 4. NPS 1-1/2 to NPS 2: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.
- J. Safety-Relief-Valve Discharge Piping NPS 2 to NPS 4: Schedule 40, black-steel and wroughtsteel fittings with welded joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install diaphragm packless valves in suction and discharge lines of compressor.
- B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.
- E. Install a full-sized, three-valve bypass around filter dryers.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- H. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
- I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 - 1. Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Hot-gas bypass valves.
 - 4. Compressor.
- K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
- L. Install receivers sized to accommodate pump-down charge.
- M. Install flexible connectors at compressors.
3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Refer to Section 15900 "HVAC Instrumentation and Controls" and Section 15940 "Sequence of Operation" for solenoid valve controllers, control wiring, and sequence of operation.
- K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 08311 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- M. Install refrigerant piping in protective conduit where installed belowground.
- N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- O. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

- Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:
 - 1. Shot blast the interior of piping.
 - 2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
 - 3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
 - 4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
 - 5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
 - 6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.
- R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- S. Identify refrigerant piping and valves according to Section 15077 "Identification for HVAC Piping and Equipment."
- T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 15093 "Sleeves and Sleeve Seals for HVAC Piping."
- U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 15093 "Sleeves and Sleeve Seals for HVAC Piping."
- V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 15098 "Escutcheons for HVAC Piping."

3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
- D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
- F. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

- 1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
- 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.
- H. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
- I. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Section 15062 "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 - 2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - 3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
 - 4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 - 5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 - 6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 - NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
 - 8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
 - 9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).
- D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
 - 2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).
 - 3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).
 - 4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Comply with ASME B31.5, Chapter VI.
 - 2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 - 3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
 - 4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 15183

MECHANICAL INSULATION - SECTION 15250

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 pipe, duct, and equipment insulation.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "Supports and Anchors" for pipe insulation shields and protection saddles.
 - 2. Division 15 Section "Metal Ductwork" for duct lining.

1.3 **DEFINITIONS**

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperatures less than 75 deg F.
- D. Thermal resistivity is designated by an r-value that represents the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (r-value) is expressed by the temperature difference in degrees Fahrenheit between the two exposed faces required to cause 1 BTU per hour to flow through 1 square foot at mean temperatures indicated.
- E. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- F. Density: Is expressed in pcf.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or

inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

- 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
- 2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.6 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after testing of piping and duct systems.
- B. Schedule insulation application after installation and testing of heat trace tape.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Glass Fiber:
 - a. CertainTeed Corporation.
 - b. Knauf Fiberglass GmbH.
 - c. Manville.
 - d. Owens-Corning Fiberglas Corporation.
 - e. USG Interiors, Inc. Thermafiber Division.
 - 2. Cellular Glass:
 - a. Pittsburgh Corning Corporation.
 - 3. Flexible Elastomeric Cellular:
 - a. Armstrong World Industries, Inc.
 - b. Halstead Industrial Products.
 - c. IMCOA.
 - d. Rubatex Corporation.
 - 4. Calcium Silicate:
 - a. Manville.
 - b. Owens-Corning Corporation.

2.2 GLASS FIBER

- A. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.
- C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

- 1. Thermal Conductivity: 0.26 Btu x inch/h x sq. ft. x deg F average maximum, at 75 deg F mean temperature.
- 2. Density: 12 pcf average maximum.
- D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets.
 - 1. Thermal Conductivity: 0.32 Btu x inch/h x sq. ft. x deg F average maximum, at 75 deg F mean temperature.
- E. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.
 - 1. Thermal Conductivity: 0.26 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
 - 2. Density: 10 pcf average maximum.
- F. Adhesive: Produced under the UL Classification and Follow-up service.
 - 1. Type: Non-flammable, solvent-based.
 - 2. Service Temperature Range: Minus 20 to 180 deg F.
- G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 <u>CELLULAR GLASS</u>

- A. Material: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.
- B. Facing: ASTM C 921, Type 1, factory-applied, laminated foil, flame-retardant, vinyl facing.
- C. Form: The following as indicated:
 - 1. Blocks: ASTM C 552, Type I.
 - 2. Boards: ASTM C 552, Type IV.
 - 3. Preformed Pipe: ASTM C 552, Type II, Class 2 (jacketed).
 - 4. Special Shapes: ASTM C 552, Type III, in shapes and thicknesses as indicated.
- D. Thermal Conductivity: 0.38 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
- E. Minimum Density: 7 pcf.
- F. Maximum Density: 9.5 pcf.

2.4 FLEXIBLE ELASTOMERIC CELLULAR

- A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
 - 1. Tubular Materials: ASTM C 534, Type I.
 - 2. Sheet Materials: ASTM C 534, Type II.
- B. Thermal Conductivity: 0.30 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.5 CALCIUM SILICATE

- A. Material: ASTM C 533, Type I; inorganic, hydrous calcium silicate, non-asbestos fibrous reinforcement; incombustible.
- B. Form: Molded flat block, curved block, grooved block, and preformed pipe sections as appropriate for surface.
- C. Thermal Conductivity: 0.60 Btu x inch/h x sq. ft. x deg F at 500 deg F.
- D. Dry Density: 15.0 pcf maximum.
- E. Compressive Strength: 60 psi minimum at 5 percent deformation.
- F. Fire Performance Characteristics: Provide materials identical to those whose fire performance characteristics have been determined, per test method indicated below, by UL or other testing and inspecting organization acceptable to authorities having jurisdiction.
 - 1. Test Method: ASTM E 84.
 - 2. Flame Spread: 0.
 - 3. Smoke Developed: 0.

2.6 INSULATING CEMENTS

- A. Mineral Fiber: ASTM C 195.
 - 1. Thermal Conductivity: 1.0 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
 - 2. Compressive Strength: 10 psi at 5 percent deformation.
- B. Expanded or Exfoliated Vermiculite: ASTM C 196.
 - 1. Thermal Conductivity: 1.10 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
 - 2. Compressive Strength: 5 psi at 5 percent deformation.
- C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.
 - 1. Thermal Conductivity: 1.2 Btu x inch/h x sq. ft. x deg F average maximum at 400 deg F mean temperature.
 - 2. Compressive Strength: 100 psi at 5 percent deformation.

2.7 <u>ADHESIVES</u>

- A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.
- B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:
 - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.

2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.8 JACKETS

- A. General: ASTM C 921, Type 1, except as otherwise indicated.
- B. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
 - 1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
 - 2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.
- C. PVC Jacketing: High-impact, ultra-violet-resistant PVC, 20 mils thick, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Adhesive: As recommended by insulation manufacturer.
- D. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mil thick, high-impact, ultra-violet-resistant PVC.
 - 1. Adhesive: As recommended by insulation manufacturer.
- E. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Finish and Thickness: Smooth finish, 0.010 inch thick.
 - 2. Moisture Barrier: 1 mil, heat-bonded polyethylene and kraft paper.
 - 3. Elbows: Preformed 45-degree and 90-degree, short- and long-radius elbows, same material, finish, and thickness as jacket.
- F. Stainless-Steel Jacket: ASTM A 167, Type 304 or 316, 0.10 inch thick, No. 2B finish, and roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Moisture Barrier: 1 mil, heat-bonded polyethylene and kraft paper.
 - 2. Elbows: Gore type, for 45-degree and 90-degree elbows in same material, thickness, finish as jackets.
 - 3. Jacket Bands: Stainless steel, Type 304, 3/4 inch wide.

2.9 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd..
 - 1. Tape Width: 4 inches.
 - 2. Cloth Standard: MIL-C-20079H, Type I.
 - 3. Tape Standard: MIL-C-20079H, Type II.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: Type 304, 0.020 inch thick.
 - 2. Galvanized Steel: 0.005 inch thick.
 - 3. Aluminum: 0.007 inch thick.
 - 4. Brass: 0.01 inch thick.
 - 5. Nickel-Copper Alloy: 0.005 inch thick.

- C. Wire: 14 gage nickel copper alloy, 16 gage, soft-annealed stainless steel, or 16 gage, softannealed galvanized steel.
- D. Corner Angles: 28 gage, 1 inch by 1 inch aluminum, adhered to 2 inches by 2 inches kraft paper.
- E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.10 SEALING COMPOUNDS

- A. Vapor Barrier Compound: Water-based, fire-resistive composition.
 - 1. Water Vapor Permeance: 0.08 perm maximum.
 - 2. Temperature Range: Minus 20 to 180 deg F.
- B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.
 - 1. Water Vapor Permeance: 0.02 perm maximum.
 - 2. Temperature Range: Minus 50 to 250 deg F.
 - 3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.
- B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.
 - 1. Follow cement manufacturer's printed instructions for mixing and portions.

3.2 INSTALLATION, GENERAL

- A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.
- B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.
- D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- E. Install insulation with smooth, straight, and even surfaces.
- F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

- G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.
- H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.
- I. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.
- J. Keep insulation materials dry during application and finishing.
- K. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:
 - 1. Fibrous glass ducts.
 - 2. Metal ducts with duct liner.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
 - 5. Flexible connectors for ducts and pipes.
 - 6. Vibration control devices.
 - 7. Testing laboratory labels and stamps.
 - 8. Nameplates and data plates.
 - 9. Access panels and doors in air distribution systems.
 - 10. Fire protection piping systems.
 - 11. Sanitary drainage and vent piping.
 - 12. Drainage piping located in crawl spaces, unless indicated otherwise.
 - 13. Below grade piping.
 - 14. Chrome-plated pipes and fittings, except for plumbing fixtures for the disabled.
 - 15. Piping specialties including air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.3 PIPE INSULATION INSTALLATION, GENERAL

- A. Tightly butt longitudinal seams and end joints. Bond with adhesive.
- B. Stagger joints on double layers of insulation.
- C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.
- D. Apply insulation with a minimum number of joints.
- E. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - Cover circumferential joints with butt strips, at least 3 inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
 - 3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.
 - a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 deg F.

- 4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
- 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
- 6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.
- F. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating. Apply insulation for exterior applications butted tightly to interior insulation ends. Extend metal jacket for exterior insulation outside roof flashing at least 2 inches below top of roof flashing. Seal metal jacket to roof flashing with vapor barrier coating.
- G. Exterior Wall Penetrations: For penetrations of below grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor barrier coating.
- H. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer.
- I. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through firerated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer.
- J. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.
- K. Flanges, Fittings, and Valves Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
 - 1. Use same material and thickness as adjacent pipe insulation.
 - 2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
 - 3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
 - 4. Insulate elbows and tees smaller than 3 inches pipe size with premolded insulation.
 - 5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
 - 6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
- L. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in Division 15 Section "Supports and Anchors." For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.
 - 1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 BELOW GROUND PIPE INSULATION INSTALLATION

A. General: The following are additional requirements for insulation applied to piping installed below ground.

- B. Coat bore surfaces of insulation materials with insulating cement of type recommended by insulation manufacturer. Apply enough cement to fill surface cells. Do not use adhesives for this coating.
- C. Secure insulation with a minimum of 2 stainless-steel bands for each section of insulation.
- D. Terminate insulation at anchor blocks.
- E. Apply insulation continuously through sleeves and manholes, except as specified above for exterior wall penetrations.
- F. Finishing: Apply 3 coats of asphaltic mastic to a finish thickness of 3/16 inch over insulation materials. Apply 10 by 10 mesh glass cloth between coats. Overlap edges of glass cloth by 2 inches.

3.5 GLASS FIBER PIPE INSULATION INSTALLATION

- A. Bond insulation to pipe with lagging adhesive.
- B. Seal exposed ends with lagging adhesive.
- C. Seal seams and joints with vapor barrier compound.

3.6 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

- A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.
- B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.
 - 1. Miter cut materials to cover soldered elbows and tees.
 - 2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.7 EQUIPMENT INSULATION INSTALLATION, GENERAL

- A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48 inches.
- B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.
- C. Insulation Thicknesses Greater than 2 Inches: Install insulation in multiple layers with staggered joints.
- D. Bevel insulation edges for cylindrical surfaces for tight joint.
- E. Secure sections of insulation in place with wire or bands spaced at 9 inches centers, except for flexible elastomeric cellular insulation.

- F. Protect exposed corners with corner angles under wires and bands.
- G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
- H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.
- I. Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16 inch. Install a layer of glass cloth embedded between layers.

3.8 GLASS FIBER EQUIPMENT INSULATION INSTALLATION

- A. Secure insulation with anchor pins and speed washers.
- B. Space anchors at maximum intervals of 18 inches in both directions and not more than 3 inches from edges and joints.
- C. Apply a smoothing coat of insulating and finishing cement to finished insulation.

3.9 FLEXIBLE ELASTOMERIC CELLULAR EQUIPMENT INSULATION INSTALLATION

- A. Install sheets of the largest manageable size.
- B. Apply full coverage of adhesive to the surfaces of the equipment and to the insulation.
- C. Butt insulation joints firmly together and apply adhesive to insulation edges at joints.

3.10 DUCT INSULATION

- A. Install block and board insulation as follows:
 - 1. Adhesive and Band Attachment: Secure block and board insulation tight and smooth with at least 50 percent coverage of adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.
 - 2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.
- B. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:
 - 1. Smaller Than 24 Inches: Bonding adhesive applied in 6 inches wide transverse strips on 12 inches centers.
 - 2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
 - 3. Overlap joints 3 inches.
 - 4. Seal joints, breaks, and punctures with vapor barrier compound.

3.11 JACKETS

- A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2 inches laps at longitudinal joints and 3 inch wide butt strips at end joints.
 - 1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.
- B. Exterior Exposed Insulation: Install continuous aluminum jackets and seal all joints and seams with waterproof sealant.
- C. Install metal jacket with 2 inches overlap at longitudinal and butt joints. Overlap longitudinal joints to shed water. Seal butt joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel draw bands 12 inches on center and at butt joints.
- D. Install the PVC jacket with 1 inch overlap at longitudinal and butt joints and seal with adhesive.
- E. Install glass cloth jacket directly over insulation. On insulation with a factory applied jacket, install the glass cloth jacket over the factory applied jacket. Install jacket drawn smooth and tight with a 2 inch overlap at joints. Embed glass cloth between (2) 1/16 inch thick coats of lagging adhesive. Completely encapsulate the insulation with the jacket, leaving no exposed raw insulation.

3.12 FINISHES

A. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation.

3.13 APPLICATIONS

- A. General: Materials and thicknesses are specified in schedules at the end of this Section.
- B. Interior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water. Insulate only roof drain bodies and horizontal rainwater leaders of storm water piping.
 - 3. Domestic hot water.
 - 4. Recirculated hot water.
 - 5. Sanitary drains for fixtures accessible to the disabled.
 - 6. Refrigerant suction.
 - 7. Hydronic piping
- C. Interior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water. Insulate only roof drain bodies and horizontal rainwater leaders of storm water piping.
 - 3. Domestic hot water.
 - 4. Recirculated hot water.
 - 5. Refrigerant suction.
 - 6. Hydronic piping

- 7. Condensate piping
- D. Exterior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water.
 - 3. Refrigerant suction.
 - 4. Hydronic piping (35 to 99 deg F).
- E. Exterior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water.
 - 3. Refrigerant suction.
 - 4. Hydronic piping (35 to 99 deg F).
- F. Equipment: Unless otherwise indicated, insulate the following indoor equipment:
 - 1. Domestic cold water equipment, tanks, and pumps.
 - 2. Domestic hot water equipment, tanks, and water heaters.
 - 3. Low temperature brine equipment, tanks, pumps, and heat exchangers, 0 deg F to 34 deg F.
 - 4. Chilled water equipment, tanks, pumps, and heat exchangers.
 - 5. Heating water equipment, tanks, pumps, and heat exchangers, 100 deg F to 250 deg F.
- G. Duct Systems: Unless otherwise indicated, insulate the following duct systems:
 - 1. Interior concealed supply, return and outside air ductwork.
 - 2. Interior exposed supply, return and outside air ductwork.
 - 3. Exterior exposed supply and return ductwork.
 - 4. Interior exposed and concealed supply fans, air handling unit casings and outside air plenums.

3.14 PIPE INSULATION SCHEDULES

- A. General: Abbreviations used in the following schedules include:
 - 1. Field-Applied Jackets: P PVC, K Foil and Paper, A Aluminum, SS Stainless Steel.
 - 2. Pipe Sizes: NPS Nominal Pipe Size.
- B. Domestic Cold Water, Condensate, and Storm Water All Sizes (Interior): 1/2 inch thick flexible elastomeric insulation. Field-applied jacket is not required.

INTERIOR DOMESTIC HOT WATER AND RECIRCULATED HOT WATER

			VAPOR	FIELD-
PIPE SIZES		THICKNESS	BARRIER	APPLIED
(NPS)	MATERIALS	IN INCHES	<u>REQ'D</u>	<u>JACKET</u>
1/2 TO 1	FLEXIBLE ELASTOMERIC	1.0	NO	NONE
1-1/4 TO 6	FLEXIBLE ELASTOMERIC	1.5	NO	NONE

SANITARY DRAINS AND TRAPS EXPOSED AT FIXTURES FOR DISABLED - REFERENCE PLUMBING PLANS.

INTERIOR REFRIGERANT SUCTION AND DUAL-TEMP CHILLED/HOT WATER (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER <u>REQ'D</u>	FIELD- APPLIED JACKET
1/2 TO 1-1/4	FLEXIBLE ELASTOMERIC	1	YES	NONE
1-1/2 TO 4	FLEXIBLE ELASTOMERIC	1	YES	NONE

EXTERIOR REFRIGERANT SUCTION AND DUAL-TEMP HYDRONIC AND CHILLED/HOT WATER (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD- APPLIED JACKET
1/2 TO	GLASS FIBER	2	YES	(A)
1-1/4	FLEXIBLE ELASTOMERIC	1	YES	NONE
1-1/2 TO 8	GLASS FIBER	2-1/2	YES	(A)
	FLEXIBLE ELASTOMERIC	1	YES	NONE

3.15 EQUIPMENT INSULATION SCHEDULES

INTERIOR EXPOSED DOMESTIC COLD WATER EQUIPMENT, TANKS, AND PUMPS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER <u>REQ'D</u>	FIELD- APPLIED JACKET
FLEXIBLE ELASTOMERIC	SHEET	1	YES	NONE

3.16 DUCT SYSTEMS INSULATION SCHEDULE - REFERENCE HVAC PLANS, HVAC NOTES

END OF SECTION 15250

DUCT ACCESSORIES - SECTION 15820

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire and smoke dampers.
 - 4. Duct silencers.
 - 5. Turning vanes.
 - 6. Duct-mounted access doors and panels.
 - 7. Flexible ducts.
 - 8. Flexible connectors.
 - 9. Duct accessory hardware.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire and smoke dampers.
 - 4. Duct silencers.
 - 5. Duct-mounted access doors and panels.
 - 6. Flexible ducts.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
 - 1. Special fittings and manual- and automatic-volume-damper installations.
 - 2. Fire- and smoke-damper installations, including sleeves and duct-mounted access doors and panels.
- C. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- C. Aluminum Sheets: ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14, sheet form; with standard, one-side bright finish for ducts exposed to view and mill finish for concealed ducts.
- D. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations.
- B. Frame: 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel, with welded corners and mounting flange.
- C. Blades: 0.025-inch- (0.6-mm-) thick, roll-formed aluminum.
- D. Blade Seals: Felt.
- E. Blade Axles: Galvanized steel.
- F. Tie Bars and Brackets: Galvanized steel.
- G. Return Spring: Adjustable tension.

2.3 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick,

with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.

- 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized, sheet steel.
- 3. Blade Axles: Galvanized steel.
- 4. Tie Bars and Brackets: Galvanized steel.

2.4 FIRE DAMPERS

- A. General: Labeled to UL 555.
- B. Fire Rating: One and one-half hours.
- C. Frame: SMACNA Type A with blades in airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.
- D. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.
- E. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.
 - 1. Minimum Thickness: 0.052 inch or 0.138 inch thick as indicated, and length to suit application.
 - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized steel blade connectors.
- H. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.
- I. Fusible Link: Replaceable, 165 rated.

2.5 <u>CEILING FIRE DAMPERS</u>

- A. General: Labeled to UL 555C; comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."
- B. Frame: 0.040-inch- thick, galvanized, sheet steel; round or rectangular; style to suit ceiling construction.
- C. Blades: 0.034-inch- thick, galvanized, sheet steel with nonasbestos refractory insulation.
- D. Fusible Link: Replaceable, 165 deg F rated.

2.6 <u>TURNING VANES</u>

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch- wide, curved blades set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for

mounting in ducts.

C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.7 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.8 <u>FLEXIBLE CONNECTORS</u>

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.
- C. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp, and 360 lbf/inch in the filling.

2.9 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Uninsulated: Spiral-wound steel spring with flameproof vinyl sheathing.
- C. Flexible Ducts, Uninsulated: Corrugated aluminum.
- D. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch- thick, glass-fiber insulation around a continuous inner liner.
 - 1. Reinforcement: Steel-wire helix encapsulated in inner liner.
 - 2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrousglass tape, and nylon hanging cord.
 - 3. Inner Liner: Polyethylene film.
- E. Pressure Rating: 6-inch wg positive, 1/2-inch wg negative.

2.10 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch, zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
- D. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install fire and smoke dampers according to manufacturer's UL-approved written instructions.
 - 1. Install fusible links in fire dampers.
- E. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15820

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POWER VENTILATORS - SECTION 15853

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 <u>SUMMARY</u>

- A. This Section includes the following:
 - 1. Utility set fans.
 - 2. Centrifugal roof ventilators.
 - 3. Axial roof ventilators.
 - 4. Upblast propeller roof exhaust fans.
 - 5. Centrifugal wall ventilators.
 - 6. Ceiling-mounted ventilators.
 - 7. In-line centrifugal fans.
- B. Products furnished, but not installed, under this Section include roof curbs for roof-mounted exhaust fans.

1.3 **PERFORMANCE REQUIREMENTS**

- A. Project Altitude: Base air ratings on actual site elevations.
- B. Operating Limits: Classify according to AMCA 99.
- C. Fan Unit Schedule: The following information is described in an equipment schedule on the Drawings.
 - 1. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound power ratings.
 - 3. Motor ratings and electrical characteristics plus motor and electrical accessories.
 - 4. Material gages and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
- C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions,

weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

- D. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
- E. Maintenance data for power ventilators to include in the operation and maintenance manual.

1.5 QUALITY ASSURANCE

- A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.
- B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- C. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.
- D. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.
- E. UL Standard: Provide power ventilators that comply with UL 705.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements. Verify clearances.
- B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

1.7 COORDINATION AND SCHEDULING

- A. Coordinate the size and location of structural steel support members.
- B. Coordinate the installation of roof curbs, equipment supports, and roof penetrations.

1.8 EXTRA MATERIALS

A. Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Centrifugal Roof Ventilators:
 - a. Broan Mfg. Co., Inc.
 - b. Carnes Co.
 - c. Cook (Loren) Co.
 - d. Essick Air Products, Breidert.
 - e. Greenheck Fan Corp.
 - f. Jenn Industries Inc.
 - 2. Upblast Propeller Roof Exhaust Fans:
 - a. Carnes Co.
 - b. Cook (Loren) Co.
 - c. Essick Air Products, Breidert.
 - d. Greenheck Fan Corp.
 - 3. Centrifugal Wall Ventilators:
 - a. Broan Mfg. Co., Inc.
 - b. Carnes Co.
 - c. Cook (Loren) Co.
 - d. Greenheck Fan Corp.
 - 4. Ceiling-Mounted Ventilators:
 - a. Broan Mfg. Co., Inc.
 - b. Carnes Co.
 - c. Cook (Loren) Co.
 - d. Greenheck Fan Corp.
 - e. Essick Air Products, Breidert.
 - f. Jenn Industries Inc.
 - 5. In-Line Centrifugal Fans:
 - a. Cook (Loren) Co.
 - b. Broan
 - c. Greenheck Fan Corp.
 - d. Carnes
 - e. Jenn Industries Inc.

2.2 CENTRIFUGAL ROOF VENTILATORS

- A. Description: Belt-driven or direct-drive centrifugal fans, as indicated, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
- C. Housing: Removable, extruded-aluminum, rectangular top; square, one-piece, aluminum base with venturi inlet cone.

- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
 - 1. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
 - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 4. Fan and motor isolated from exhaust air stream.
- F. Accessories: The following items are required as indicated:
 - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 - 2. Bird Screens: Removable 1/2-inch (13-mm) mesh, aluminum or brass wire.
 - 3. Roof Curbs: Galvanized steel; mitered and welded corners; 2-inch- (50-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 2-inch (50-mm) wood nailer. Size as required to suit roof opening and fan base.

2.3 UPBLAST PROPELLER ROOF EXHAUST FANS

- A. Description: Belt-driven or direct-drive propeller fans, as indicated, consisting of housing, wheel, butterfly-type discharge damper, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- B. Wind Band, Fan Housing, and Base: Reinforced and braced aluminum, containing aluminum butterfly dampers and rain trough, motor and drive assembly, and fan wheel.
 - 1. Damper Rods: Steel with bronze bearings.
 - 2. Damper Rods: Steel with nylon bearings.
- C. Fan Wheel: Replaceable, cast-aluminum blades fastened to cast-aluminum hub; factory set pitch angle.
- D. Belt-Driven Drive Assembly: Resiliently mounted to the housing; weatherproof housing of same material as fan housing with the following features:
 - 1. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
 - 2. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings.
 - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 4. Motor Mount: On outside of fan cabinet, adjustable base for belt tensioning.
- E. Roof Curbs: Galvanized steel; mitered and welded corners; 2-inch- (50-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 2-inch (50-mm) wood nailer. Size as required to suit roof opening and fan base.

2.4 CENTRIFUGAL WALL VENTILATORS

- A. Description: Belt-driven or direct-drive centrifugal fans, as indicated, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
- B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; venturi inlet cone.
- C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

- D. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
 - 1. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
 - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 4. Fan and motor isolated from exhaust air stream.
- E. Accessories: The following items are required as indicated:
 - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through internal aluminum conduit.
 - 2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
 - 3. Wall Grille: Ring type for flush mounting.
 - 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in wall sleeve; factory set to close when fan stops.

2.5 CEILING-MOUNTED VENTILATORS

- A. Description: Centrifugal fans designed for installing in ceiling or wall, or for concealed in-line applications.
- B. Housing: Galvanized steel lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
- D. Grille: Louvered grille with flange on intake and thumbscrew attachment to fan housing.
- E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- F. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent.
- G. Accessories: Manufacturer's standard roof jack or wall cap, and transition fittings.

2.6 IN-LINE CENTRIFUGAL FANS

- A. Description: In-line, belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, drive assembly, motor and disconnect switch, mounting brackets, and accessories.
- B. Housing: Split, spun-aluminum housing, with aluminum straightening vanes; inlet and outlet flanges; and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Direct-Drive Units: Motor encased in housing out of air stream, factory wired to disconnect located on outside of fan housing.
- D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- E. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

- F. Accessories: The following accessories are required as indicated:
 - 1. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
 - 2. Companion Flanges: For inlet and outlet duct connections.
 - 3. Fan Guards: Expanded metal in removable frame. Provide belt guards for units not connected to ductwork.

2.7 <u>MOTORS</u>

- A. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.
- B. Enclosure Type: The following features are required as indicated:
 - 1. Open dripproof motors where satisfactorily housed or remotely located during operation.
 - 2. Guarded dripproof motors where exposed to contact by employees or building occupants.

2.8 FACTORY FINISHES

- A. Sheet Metal Parts: Prime coat before final assembly.
- B. Exterior Surfaces: Baked-enamel finish coat after assembly.
- C. Aluminum Parts: No finish required.

2.9 SOURCE QUALITY CONTROL

- A. Testing Requirements: The following factory tests are required as indicated:
 - 1. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA Seal.
 - Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install power ventilators according to manufacturer's written instructions.
- B. Support units using the vibration-control devices.
 - 1. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

- 2. Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.
- 3. Ceiling Units: Suspend units from structure using steel wire or metal straps.
- C. Install units with clearances for service and maintenance.
- D. Label units according to plans.

3.3 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.
- B. Electrical: Conform to applicable requirements in Division 16 Sections.
- C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

3.5 <u>ADJUSTING</u>

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.

3.6 <u>CLEANING</u>

- A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- B. Clean fan interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

3.7 <u>COMMISSIONING</u>

- A. Final Checks before Startup: Perform the following operations and checks before startup:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.

- 3. Perform cleaning and adjusting specified in this Section.
- 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
- 5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
- 6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.
- 7. Disable automatic temperature-control operators.
- B Starting procedures for fans are as follows:
 - 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
 - 2. Measure and record motor voltage and amperage.
- C. Shut unit down and reconnect automatic temperature-control operators.
- D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for air-handlingsystem testing, adjusting, and balancing.
- E. Replace fan and motor pulleys as required to achieve design conditions.

3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
- B. Review data in the operation and maintenance manuals.
- C. Schedule training with Owner, through Architect, with at least 7 days' advance notice.
- D. Demonstrate operation of power ventilators. Conduct walking tour of the Project. Briefly identify location and describe function, operation, and maintenance of each power ventilator.

END OF SECTION 15853

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.
- B. Requirements of the following Division 15 Sections apply to this section:
 - 1. "Basic Mechanical Requirements."
 - 2. "Basic Mechanical Materials and Methods."

1.2 <u>SUMMARY</u>

A. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air conditioning systems in pressure classes from minus 2 inches to plus 10 inches water gage.

1.3 DEFINITIONS

- A. Sealing Requirements Definitions: For the purposes of duct systems sealing requirements specified in this Section, the following definitions apply:
 - 1. Seams: A seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. All other duct surface connections made on the perimeter are deemed to be joints.
 - 2. Joints: Joints include girth joints; branch and subbranch intersections; so-called duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system. Changes or alterations to the layout or configuration of the duct system must be specifically approved in writing. Accompany requests for layout modifications with calculations showing that the proposed layout will provide the original design results without increasing the system total pressure.

1.5 <u>SUBMITTALS</u>

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data including details of construction relative to materials, dimensions of individual components, profiles, and finishes for the following items:
 - 1. Sealing Materials.
 - 2. Fire-Stopping Materials.

- C. Shop drawings from duct fabrication shop, drawn to a scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as the Contract Drawings, detailing:
 - 1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.
 - 2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust ducts systems, indicate the classification of the materials handled as defined in this Section.
 - 3. Fittings.
 - 4. Reinforcing details and spacing.
 - 5. Seam and joint construction details.
 - 6. Penetrations through fire-rated and other partitions.
 - 7. Terminal unit, coil, and humidifier installations.
 - 8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.
- D. Welding certificates including welding procedures specifications, welding procedures qualifications test records, and welders' qualifications test records complying with requirements specified in "Quality Assurance" below.
- E. Record drawings including duct systems routing, fittings details, reinforcing, support, and installed accessories and devices, in accordance with Division 15 Section "Basic Mechanical Requirements" and Division 1.
- F. Maintenance data for volume control devices, fire dampers, and smoke dampers, in accordance with Division 15 Section "Basic Mechanical Requirements" and Division 1.

1.6 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel" for hangers and supports and AWS D9.1 "Sheet Metal Welding Code."
- B. Qualify each welder in accordance with AWS qualification tests for welding processes involved. Certify that their qualification is current.
- C. NFPA Compliance: Comply with the following NFPA Standards:
 - 1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," except as indicated otherwise.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and fire-stopping materials to site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle sealant fire-stopping materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
- C. Deliver and store stainless steel sheets with mill-applied adhesive protective paper, maintained through fabrication and installation.
PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Sheet Metal, General: Provide sheet metal in thicknesses indicated, packaged and marked as specified in ASTM A 700.
- B. Galvanized Sheet Steel: Lock-forming quality, ASTM A 527, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.
- C. Carbon Steel Sheets: ASTM A 366, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- D. Reinforcement Shapes and Plates: Unless otherwise indicated, provide galvanized steel reinforcing where installed on galvanized sheet metal ducts. For aluminum and stainless steel ducts provide reinforcing of compatible materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SEALING MATERIALS

- A. Joint and Seam Sealants, General: The term sealant used here is not limited to materials of adhesive or mastic nature, but also includes tapes and combinations of open weave fabric strips and mastics.
- B. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with FS TT-S-001657, Type I; formulated with a minimum of 75 percent solids.
- C. Flanged Joint Mastics: One-part, acid-curing, silicone elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.3 FIRE-STOPPING

- A. Fire-Resistant Sealant: Provide one-part elastomeric sealant formulated for use in a throughpenetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
 - 2. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
 - 3. "RTV 7403"; General Electric Co.
 - 4. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.

- B. Hangers: Galvanized sheet steel, or round, uncoated steel, threaded rod.
 - 1. Straps and Rod Sizes: Conform with Table 4-1 in SMACNA HVAC Duct Construction Standards, 1985 Edition, for sheet steel width and gage and 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 conforming to ASTM A 36.
 - 1. Where galvanized steel ducts are installed, provide hot-dipped-galvanized steel shapes and plates.
 - 2. For stainless steel ducts, provide stainless steel support materials.
 - 3. For aluminum ducts, provide aluminum support materials, except where materials are electrolytically separated from ductwork.

2.5 RECTANGULAR DUCT FABRICATION

- A. General: Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1-3 through 1-19, including their associated details. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.
 - 1. Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 - 2. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Static Pressure Classifications: Except where otherwise indicated, construct duct systems to the following pressure classifications:
 - 1. Supply Ducts: 3 inches water gage.
 - 2. Return Ducts: 2 inches water gage, negative pressure.
 - 3. Exhaust Ducts: 2 inches water gage, negative pressure.
- C. Crossbreaking or Cross Beading: Crossbreak or bead duct sides that are 19 inches and larger and are 20 gage or less, with more than 10 sq. ft. of unbraced panel area, as indicated in SMACNA "HVAC Duct Construction Standard," Figure 1-4, unless they are lined or are externally insulated.

2.6 RECTANGULAR DUCT FITTINGS

A. Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standard," 1985 Edition, Figures 2-1 through 2-10.

2.7 ROUND AND FLAT OVAL DUCT FABRICATION

A. General: "Basic Round Diameter" as used in this article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given sized of flat oval duct. Except where interrupted by fittings, provide round and flat oval ducts in lengths not less than 12 feet. Insulate all round duct with 1 1/2" external wrap insulation.

- B. Round Ducts: Fabricate round supply ducts with spiral lockseam construction, except where diameters exceed 72 inches. Fabricate ducts having diameters greater than 72 inches with longitudinal butt-welded seams. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.
- C. Round Ducts: Fabricate round supply ducts using seam types identified in SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figure 3-1, RL-1, RL-4, or RL-5. Seams Types RL-2 or RL-3 may be used if spot-welded on 1-inch intervals. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.
- D. Flat Oval Ducts: Fabricate flat oval supply ducts with standard spiral lockseams (without intermediate ribs) or with butt-welded longitudinal seams in gages listed in SMACNA "HVAC Duct Construction Standards," Table 3-4.

2.8 ROUND AND FLAT OVAL SUPPLY AND EXHAUST FITTINGS FABRICATION

- A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to conform to SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figures 3-4 and 3-5 and with metal thicknesses specified for longitudinal seam straight duct.
- B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from the body onto branch tap entrance.
- C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate the bend radius of die-formed, gored, and pleated elbows 1.5 times the elbow diameter. Unless elbow construction type is indicated, provide elbows meeting the following requirements:
 - 1. Mitered Elbows: Fabricate mitered elbows with welded construction in gages specified below.
 - a. Mitered Elbows Radius and Number of Pieces: Unless otherwise indicated, construct elbow to comply with SMACNA "HVAC Duct Construction Standards," Table 3-1.
 - b. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from minus 2 inches to plus 2 inches:
 - 1) 3 to 26 inches: 24 gage.
 - 2) 27 to 36 inches: 22 gage.
 - 3) 37 to 50 inches: 20 gage.
 - 4) 52 to 60 inches: 18 gage.
 - 5) 62 to 84 inches: 16 gage.
 - c. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from 2 inches to 10 inches:
 - 1) 3 to 14 inches: 24 gage.
 - 2) 15 to 26 inches: 22 gage.
 - 3) 27 to 50 inches: 20 gage.
 - 4) 52 to 60 inches: 18 gage.
 - 5) 62 to 84 inches: 16 gage.
 - d. Flat Oval Mitered Elbows: Solid welded and with the same metal thickness as longitudinal seam flat oval duct.
 - e. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material handling classes A and B; and only where space restrictions do not permit the use of 1.5 bend radius elbows. Fabricate with a single-thickness turning vanes.

- 2. Round Elbows 8 Inches and Smaller: Die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 3-1/2- and 4-1/2-inch) elbows with gored construction.
- 3. Round Elbows 9 Through 14 Inches: Gored or pleated elbows for 30, 45, 60, and 90 degrees, except where space restrictions require a mitered elbow. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 9-1/2- and 10-1/2-inch) elbows with gored construction.
- 4. Round Elbows Larger Than 14 Inches and All Flat Oval Elbows: Gored elbows, except where space restrictions require a mitered elbow.
- 5. Die-Formed Elbows for Sizes Through 8 Inches and All Pressures: 20 gage with 2-piece welded construction.
- 6. Round Gored Elbows Gages: Same as for nonelbow fittings specified above.
- 7. Flat Oval Elbows Gages: Same as longitudinal seam flat oval duct.
- 8. Pleated Elbows Sizes Through 14 Inches and Pressures Through 10 Inches: 26 gage.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

- A. Duct System Pressure Class: Construct and install each duct system for the specific duct pressure classification indicated.
- B. Install ducts with the fewest possible joints.
- C. Use fabricated fittings for all changes in directions, changes in size and shape, and connections.
- D. Install couplings tight to duct wall surface with projections into duct at connections kept to a minimum.
- E. Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Provide clearance of 1 inch where furring is shown for enclosure or concealment of ducts, plus allowance for insulation thickness, if any.
- H. Install insulated ducts with 1-inch clearance outside of insulation.
- I. Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.
- J. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- K. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2 inches.

3.2 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints as follows:
- B. Pressure Classifications Greater Than 3 Inches Water Gage: All transverse joints, longitudinal seams, and duct penetrations.
- C. Pressure Classification 2 and 3 Inches Water Gage: All transverse joints and longitudinal seams.
 - 1. Pressure Classification Less than 2 Inches Water Gage: Transverse joints only.
- D. Seal externally insulated ducts prior to insulation installation.

3.3 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards," Tables 4-1 through 4-3 and Figures 4-1 through 4-8.
- B. Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- D. Upper attachments to structures shall have an allowable load not exceeding 1/4 of the failure (proof test) load but are not limited to the specific methods indicated.
- E. Install concrete insert prior to placing concrete.
- F. Install powder actuated concrete fasteners after concrete is placed and completely cured.

3.4 MINIMUM FASTENERS

A. Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint.

Exception: Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion so as to prevent a hinge effect.

3.5 CONNECTIONS

- A. Equipment Connections: Connect equipment with flexible connectors in accordance with Division 15 Section "Duct Accessories."
- B. Branch Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-7 and 2-8.
- C. Outlet and Inlet Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-16 through 2-18.
- D. Terminal Units Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figure 2-19.

3.6 FIELD QUALITY CONTROL

- A. The Owner will contract with an independent testing agency to perform, record, and report leakage tests.
- B. Remake leaking joints as required and apply sealants to achieve specified maximum allowable leakage.

3.7 ADJUSTING AND CLEANING

A. Adjust volume control devices as required by the testing and balancing procedures to achieve required air flow. Refer to Division 15 Section "TESTING, ADJUSTING, AND BALANCING" for requirements and procedures for adjusting and balancing air systems.

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B. Vacuum ducts systems prior to final acceptance to remove dust and debris.

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END OF SECTION 15891

AIR OUTLETS AND INLETS - SECTION 15932

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 work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.
- B. Types of outlets and inlets required for project include the following:
 - 1. Ceiling air diffusers.
 - 2. Wall registers and grilles.
 - 3. Louvers.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
 - 2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
 - 3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
 - 4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
 - 5. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.4 <u>SUBMITTALS</u>

- A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:
 - 1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
 - 2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
 - 3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

- B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.
- C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 <u>CEILING AIR DIFFUSERS</u>

- A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
- D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering diffusers which may be incorporated in the work include, but are not limited to, the following:
 - 1. Anemostat Products Div.; Dymanics Corp. of America.
 - 2. Cranes Co.; Div. of Wehr Corp.
 - 3. Krueger Mfg. Co.
 - 4. Titus Products Div.; Philips Industries, Inc.
 - 5. Tuttle & Bailey; Div. of Interpace Corp.

2.2 WALL REGISTERS AND GRILLES

- A. General: Except as otherwise indicated, provide manufacturer's standard wall registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide wall registers and grilles that have, as minimum, temperature and velocity

traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.

- C. Wall Compatibility: Provide registers and grilles with border styles that are compatible with adjacent wall systems, and that are specifically manufactured to fit into wall construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall construction which will contain each type of wall register and grille.
- D. Types: Provide wall registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering registers and grilles which may be incorporated in the work include, but are not limited to, the following:
 - 1. Anemostat Products Div.; Dynamics Corp. of America.
 - 2. Carnes Co.; Div. of Wehr Corp.
 - 3. Titus Products Div.; Philips Industries, Inc.

2.3 LOUVERS

- A. General: Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Performance: Provide louvers that have minimum free area, and maximum pressure drop of each type as listed in manufacturer's current data, complying with louver schedule.
- C. Substrate Compatibility: Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.
- D. Materials: Construct of aluminum extrusions, ASTM B 221, Alloy 6063-T52. Weld units or use stainless steel fasteners.
- E. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.
- F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering louvers which may be incorporated in the work include, but are not limited to, the following:
 - 1. Airline Products Co.
 - 2. Airolite Co.
 - 3. American Warming & Ventilating Inc.
 - 4. Arrow United Industries, Inc.
 - 5. Construction Specialties, Inc.
 - 6. Dowco Corp.
 - 7. Industrial Louvers, Inc.
 - 8. Louvers & Dampers, Inc.
 - 9. Penn Ventilator Co., Inc.
 - 10. Ruskin Mfg. Co.
 - 11. Safe-Air Inc.
 - 12. Snyder (E.G.) Co., Inc.
 - 13. Vent Products Co., Inc.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.
- B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.

3.3 SPARE PARTS

A. Furnish to Owner, with receipt, 3 operating keys for each type of air outlet and inlet that require them.

END OF SECTION 15932

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 work of this section.

1.2 SUMMARY

- A. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- B. Test, adjust, and balance the following mechanical systems:
 - 1. Supply air systems, all pressure ranges; including variable volume and double duct systems:
 - 2. Return air systems;
 - 3. Exhaust air systems;
 - 4. Hydronic systems;
 - 5. Verify temperature control system operation.
- C. Test systems for proper sound and vibration levels.
- D. This Section does not include:
 - 1. Specifications for materials for patching mechanical systems;
 - 2. 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 <u>DEFINITIONS</u>

- A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 - 1. the balance of air and water distribution;
 - 2. adjustment of total system to provide design quantities;
 - 3. electrical measurement;
 - 4. verification of performance of all equipment and automatic controls;
 - 5. sound and vibration measurement.
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).
- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

1.4 <u>SUBMITTALS</u>

- A. Agency Data:
 - 1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.
- B. Engineer and Technicians Data:
 - 1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.
- C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.
- D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1 and Section 15010.
- E. Sample Forms: Submit sample forms, if other than those standard forms prepared by the NEBB are proposed.
- F. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:
 - 1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

- 2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
- 3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. General Information and Summary
 - b. Air Systems
 - c. Hydronic Systems
 - d. Temperature Control Systems
 - e. Special Systems
 - f. Sound and Vibration Systems
- 4. Report Contents: Provide the following minimum information, forms and data:
 - a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
 - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.
 - c. Test and balance shall include complete coil performance for each operating mode (heating, cooling, and dehumidification). Coil performance shall include entering and leaving coil temperatures (db/wb).
- G. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.5 QUALITY ASSURANCE

- A. PRE-QUALIFIED CONTRACTORS FOR THIS ROLE.
 - 1. Superior Test & Balance, Inc. (AABC) 1545 Gulf Shores Parkway, PMB #294 Gulf Shores, AL 36542 Tel: 251.317.3088
 - Systems Analysis, Inc. (AABC & NEBB) 217 Oxmoor Circle Birmingham, AL 35209 Tel: 205.802.7850
 - 3. National True-Test, Inc. (NEBB) 5757 Carrington Lake Parkway Trussville, AL 35173 Tel: 205.681.9050

- Environmental Testing Service, Inc. (NEBB) 150 Highway 216 Montevallo, AL 35115 Tel: (205) 476-8640
- Performance Testing & Balancing Co., Inc. (AABC) 2021 Five Points Road Cleveland, Alabama 35049 Tel: (205) 559-2773
- B. Any Test & Balance Contractors not listed above must be requested and approved in writing ten (10) days prior to the bid.
- C. Agency Qualifications:
 - Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
 - 2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB as a Test and Balance Engineer.
- D. Codes and Standards:
 - 1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
 - 2. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.
- E. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.6 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.7 SEQUENCING AND SCHEDULING

- A. Test, adjust, and balance the air systems before hydronic, steam, and refrigerant systems.
- B. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg F (3 degs C) wet bulb temperature of maximum summer design condition, and within 10 deg F (6 deg C) dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

- A. Before operating the system, perform these steps:
 - 1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
 - 2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
 - 3. Compare design to installed equipment and field installations.
 - 4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
 - 5. Check filters for cleanliness.
 - 6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
 - 7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
 - 8. Determine best locations in main and branch ductwork for most accurate duct traverses.
 - 9. Place outlet dampers in the full open position.
 - 10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
 - 11. Lubricate all motors and bearings.
 - 12. Check fan belt tension.
 - 13. Check fan rotation.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

- A. Before operating the system perform these steps:
 - 1. Open valves to full open position. Close coil bypass valves.
 - 2. Remove and clean all strainers.
 - 3. Examine hydronic systems and determine if water has been treated and cleaned.
 - 4. Check pump rotation.
 - 5. Clean and set automatic fill valves for required system pressure.
 - 6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
 - 7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
 - 8. Set temperature controls so all coils are calling for full flow.
 - 9. Check operation of automatic bypass valves.
 - 10. Check and set operating temperatures of chillers to design requirements.
 - 11. Lubricate all motors and bearings.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

- B. Provide instruments meeting the specifications of the referenced standards.
- C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
- D. Apply instrument as recommended by the manufacturer.
- E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.
- F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
- G. Take all reading with the eye at the level of the indicated value to prevent parallax.
- H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.
- I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

- A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
- B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
- C. Patch insulation, ductwork, and housings, using materials identical to those removed.
- D. Seal ducts and piping, and test for and repair leaks.
- E. Seal insulation to re-establish integrity of the vapor barrier.
- F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
- G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 TESTING FOR SOUND AND VIBRATION

A. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

3.6 RECORD AND REPORT DATA

- A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.
- B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.7 DEMONSTRATION

A. Training:

- 1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1 and Section 15010.
- 2. Schedule training with Owner through the Architect/Engineer with at least 7 days prior notice.

END OF SECTION 15990

NEW GYMNASIUM FOR HAMILTON MIDDLE SCHOOL MARION COUNTY BOARD OF EDUCATION

Mechanical

Section 15010 - Basic Mechanical Requirements Section 15050 - Basic Mechanical Materials and Methods Section 15145 - Hangers and Supports Section 15183 - Refrigerant Piping Section 15250 - Mechanical Insulation Section 15820 - Duct Accessories Section 15853 - Power Ventilators Section 15891 - Metal Ductwork Section 15932 - Air Outlets and Inlets Section 15990 - Testing, Adjusting and Balancing

Plumbing

Section 15010 - Basic Mechanical Requirements Section 15050 - Basic Mechanical Materials and Methods Section 15100 - Valves Section 15135 - Meters and Gages Section 15145 - Hangers and Supports Section 15150 - Sanitary Waste and Vent Piping Section 15250 - Mechanical Insulation Section 15411 - Water Distribution Piping Section 15430 - Plumbing Specialties Section 15440 - Plumbing Fixtures

Fire Protection

Section 15915 - Fire-Suppression Piping

WHORTON ENGINEERING, INC.

COOSIA.:rm 8'-KJBIS

RANDALL WHORTON, PE, CEM.

PH# (256)820-9897 FAX: (256)820-9896 25 SMERALL GAIE ROAD AI'NSTON, ALABAMA 38205



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 and the other sections of Division 15.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT," for factory-installed motors, controllers, accessories, and connections.
 - Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS," for materials and methods common to the remainder of Division 15, plus general related specifications including:
 - a. Access to mechanical installations.
 - b. Excavation for mechanical installations within the building boundaries, and from building to utilities connections.

1.3 <u>SUBMITTALS</u>

- A. General: Follow the procedures specified in Division 1 Section "SUBMITTALS."
- B. Increase, by the quantity listed below, the number of mechanical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Mechanical Consulting Engineer.
 - 1. Shop Drawings Initial Submittal: 1 additional blue- or black-line prints.
 - 2. Shop Drawings Final Submittal: 1 additional blue- or black-line prints.
 - 3. Product Data: 1 additional copy of each item.
 - 4. Samples: 1 addition as set.
- C. Additional copies may be required by individual sections of these Specifications.

1.4 <u>RECORD DOCUMENTS</u>

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, indicate the following installed conditions:
 - 1. Ductwork mains and branches, size and location, for both exterior and interior; locations of dampers and other control devices; filters, boxes, and terminal units requiring periodic maintenance or repair.
 - 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 - Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 Approved substitutions, Contract Modifications, and actual equipment and materials
 - installed.5. Contract Modifications, actual equipment and materials installed.

1.5 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems,

materials, and equipment. Comply with the following requirements:

- 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
- 2. Verify all dimensions by field measurements.
- 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
- 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- 5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
- 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
- 7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- 8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
- 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
- 10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- 11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 15 Section "BASIC MECHANICAL MATERIALS AND METHODS."
- 12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:
 - 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - 1. Uncover Work to provide for installation of ill-timed Work.
 - 2. Remove and replace defective Work.
 - 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 - 4. Remove samples of installed Work as specified for testing.
 - 5. Install equipment and materials in existing structures.
 - 6. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, plumbing

fixtures and trim, and other mechanical items made obsolete by the new Work.

- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 - 1. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - 2. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION 15010

BASIC MECHANICAL MATERIALS AND METHODS - SECTION 15050

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Nonshrink grout for equipment installations.
 - 9. Field-fabricated metal and wood equipment supports.
 - 10. Installation requirements common to equipment specification sections.
 - 11. Mechanical demolition.
 - 12. Cutting and patching.
 - 13. Touchup painting and finishing.
- B. Pipe and pipe fitting materials are specified in Division 15 piping system Sections.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.

- 2. CPVC: Chlorinated polyvinyl chloride plastic.
- 3. NP: Nylon plastic.
- 4. PE: Polyethylene plastic.
- 5. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. CR: Chlorosulfonated polyethylene synthetic rubber.
 - 2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- C. Coordination Drawings: For access panel and door locations.
- D. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 - 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 - 2. Clearances for installing and maintaining insulation.
 - 3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 - 4. Equipment and accessory service connections and support details.
 - 5. Exterior wall and foundation penetrations.
 - 6. Fire-rated wall and floor penetrations.
 - 7. Sizes and location of required concrete pads and bases.
 - 8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
 - 9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 - 10. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.
- E. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 <u>MANUFACTURERS</u>

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Dielectric Unions:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Eclipse, Inc.; Rockford-Eclipse Div.
 - d. Epco Sales Inc.
 - e. Hart Industries International, Inc.

- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Industries, Inc.; Wilkins Div.
- 2. Dielectric Flanges:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Co.
 - c. Epco Sales Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- 3. Dielectric-Flange Insulating Kits:
 - a. Calpico, Inc.
 - b. Central Plastics Co.
- 4. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- 5. Dielectric Nipples:
 - a. Grinnell Corp.; Grinnell Supply Sales Co.
 - b. Perfection Corp.
 - c. Victaulic Co. of America.
- 6. Metal, Flexible Connectors:
 - a. ANAMET Industrial, Inc.
 - b. Central Sprink, Inc.
 - c. Flexicraft Industries.
 - d. Flex-Weld, Inc.
 - e. Grinnell Corp.; Grinnell Supply Sales Co.
 - f. Hyspan Precision Products, Inc.
 - g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
 - h. Mercer Rubber Co.
 - i. Metraflex Co.
 - j. Proco Products, Inc.
 - k. Uniflex, Inc.
- 7. Rubber, Flexible Connectors:
 - a. General Rubber Corp.
 - b. Mercer Rubber Co.
 - c. Metraflex Co.
 - d. Proco Products, Inc.
 - e. Red Valve Co., Inc.
 - f. Uniflex, Inc.
- 8. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32.
 - 1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
- F. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements: Manufacturer's standard solvent cements for the following:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.
- I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.
- J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
- K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.

- 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
- 3. Gaskets: Rubber.
- 4. Bolts and Nuts: AWWA C111.
- 5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- F. 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.
 - 1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 FLEXIBLE CONNECTORS

- A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:
 - 1. 2-Inch NPS and Smaller: Threaded.
 - 2. 2-1/2-Inch NPS and Larger: Flanged.
 - 3. Option for 2-1/2-Inch NPS and Larger: Grooved for use with keyed couplings.
- B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.
- C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose. Do not use for potable water
- D. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose. Do not use for potable water.

E. Rubber, Flexible Connectors: CR or EPDM elastomer rubber construction, with multiple plies of NP fabric, molded and cured in hydraulic presses. Include 125-psig minimum working-pressure rating at 220 deg F. Units may be straight or elbow type, unless otherwise indicated. Do not use for potable water unless units comply with NSF61.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
 - 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 - 2. OD: Completely cover opening.
 - 3. Cast Brass: One piece, with set screw.
 - a. Finish: Polished chrome-plate.
 - 4. Cast Brass: Split casting, with concealed hinge and set screw.
 - a. Finish: Polished chrome-plate.
 - 5. Stamped Steel: One piece, with set screw and chrome-plated finish.
 - 6. Stamped Steel: One piece, with spring clips and chrome-plated finish.
 - 7. Stamped Steel: Split plate, with concealed hinge, set screw, and chrome-plated finish.
 - 8. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
 - 9. Stamped Steel: Split plate, with exposed-rivet hinge, set screw, and chrome-plated finish.
 - 10. Stamped Steel: Split plate, with exposed-rivet hinge, spring clips, and chrome-plated finish.
 - 11. Cast-Iron Floor Plate: One-piece casting.

2.8 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

- 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
- 2. Location: Accessible and visible location.
- C. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap on, colorcoded, complying with ASME A13.1.
 - D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, colorcoded, pressure-sensitive vinyl, complying with ASME A13.1.
 - E. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:
 - 1. Green: Cold air.
 - 2. Yellow: Hot air.
 - 3. Yellow/Green or Green: Supply air.
 - 4. Blue: Exhaust, outside, return, and mixed air.
 - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 - 6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.
 - d. Duct destination.
 - e. Design cubic feet per meter.
 - F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resinlaminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
 - 1. Fabricate in sizes required for message.
 - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 - 3. Punch for mechanical fastening.
 - 4. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches long; 1/8 inch for larger units.
 - 5 Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
 - G. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.
 - 3. Yellow/Green: Combination cooling and heating equipment and components.
 - 4. Brown: Energy reclamation equipment and components.
 - 5. Blue: Equipment and components that do not meet any criteria above.
 - 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
 - 7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.

- 8. Size: Approximate 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.
- H. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
 - Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

2.9 <u>GROUT</u>

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
 - 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psig, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 15 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at slope in accordance with related codes.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.

- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
 - 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE removable sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Build sleeves into new walls and slabs as work progresses.
 - 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsumboard partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - 1. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 - 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 - Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

- R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
 - 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - 6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 - 7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
 - 8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Pressure Piping: ASTM D 2672.
 - c. PVC Nonpressure Piping: ASTM D 2855.

- W. Piping Connections: Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 - 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Plastic markers, with application systems. Install on insulation segment if required for hot, uninsulated piping.
 - 2. Locate pipe markers as follows if piping is exposed in finished spaces, machine rooms, and accessible maintenance spaces, such as shafts, tunnels, plenums, and exterior nonconcealed locations:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, if flow pattern is not obvious.
 - c. Near locations if pipes pass through walls, floors, ceilings, or enter nonaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
 - g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.
 - 1. Lettering Size: Minimum 1/4-inch- high lettering for name of unit if viewing distance is less than 24 inches, 1/2-inch- high lettering for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
 - 1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.
- D. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.

3.4 PAINTING AND FINISHING

- A. Apply paint to exposed piping according to the following, unless otherwise indicated:
 - 1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 - 4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
 - 5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 - 6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- B. Do not paint piping specialties with factory-applied finish.
- C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 6 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psig, 28-day compressive-strength concrete and reinforcement.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.8 <u>DEMOLITION</u>

- A. Disconnect, demolish, and remove Work specified in Division 15 Sections.
- B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from Project site.
- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING - ROOF/CURB PENETRATIONS

A. The HVAC contractor shall not cut or penetrate the roof. Roofing contractor to make all roof penetrations and provide/install all curbs. Coordinate curb and roof penetrations needed with roofing contractor. Refer to roof curb specifications.

3.10 CUTTING AND PATCHING – GENERAL

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.11 <u>GROUTING</u>

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.

- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

PART 4 - HVAC EQUIPMENT

4.1 EXHAUST FANS

- A. Description: Fan shall be ceiling mounted, direct driven, centrifugal exhaust fan.
- B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.
- C. Construction: The fan wheel housing and integral outlet duct shall be injection molded from a specially engineered resin exceeding UL requirements for smoke and heat generation.
 - 1. The outlet duct shall have provision for an aluminum backdraft damper with continuous aluminum hinge rod.
 - 2. The inlet box shall be minimum 22 gauge galvanized steel.
 - 3. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet.
 - 4. A field wiring compartment with receptacle shall be standard.
 - 5. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided.
 - 6. A white, high impact styrene injection molded grill shall be provided as standard. Unit shall be designed with provision for field conversion from ceiling to in-line.
 - 7. Unit shall be shipped in ISTA certified transit tested packaging.
- D. Wheel: 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.
- E. Motor: 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.

4.2 REFRIGERANT PIPING AND ACCESSORIES

A. General: Sized and installed in accordance with compressor manufacturer's recommendations. Material shall be soft copper. Joints, fitting, etc. shall be in accordance with manufacturer's recommendations.

4.3 <u>HVAC EQUIPMENT</u>

A. HVAC equipment shall be in accordance with the manufacturer's standard equipment as listed and scheduled on the plans.

4.4 WARRANTIES

A. Warranties shall begin at date of substantial completion. All compressors shall include minimum of five year warranty. One year warranty for labor, parts, units, etc. is required for all equipment.

END OF SECTION 15050

VALVES - SECTION 15100

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 general duty valves common to several mechanical piping systems.

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 valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.
- C. Maintenance data for valves to include in the operation and maintenance manual. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set globe and gate valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Gate Valves:
 - a. Crane Company; Valves and Fitting Division.
 - b. Hammond Valve Corporation.
 - c. Kitz Corp. of America.
 - d. Lunkenheimer/Cincinnati Valve Co.
 - e. Milwaukee Valve Company, Inc.
 - f. NIBCO Inc.
 - g. Powell: Wm. Powell Company (The).
 - h. Red-White Valve Corp.
 - i. Stockham Valves & Fittings, Inc.
 - 2. Ball Valves:
 - a. Conbraco Industries, Inc.; Apollo Division.
 - b. Hammond Valve Corporation.
 - c. Milwaukee Valve Company, Inc.
 - d. NIBCO Inc.
 - e. Stockham Valves & Fittings, Inc.
 - f. Tyler Pipe.
 - g. Victaulic Company of America.
 - 3. Plug Valves:
 - a. Grinnell Corp.
 - b. Huber: J.M. Huber Corp.; Flow Control Division (Resun Valves).
 - c. NIBCO Inc.
 - d. Stockham Valves & Fittings, Inc.
 - e. Victaulic Company of America.
 - 4. Globe Valves:
 - a. Crane Company; Valves and Fitting Division.
 - b. Hammond Valve Corporation.
 - c. Kitz Corp. of America.
 - d. Lunkenheimer/Cincinnati Valve Co.
 - e. Milwaukee Valve Company, Inc.
 - f. NIBCO Inc.
 - g. Powell: Wm. Powell Company (The).
 - h. Red-White Valve Corp.
 - i. Stockham Valves & Fittings, Inc.
 - 5. Butterfly Valves:
 - a. Center Line, Mark Controls Corporation.
 - b. Crane Company; Valves and Fitting Division.
 - c. General Signal; DeZurik Unit.

- d. Grinnell Corp.
- e. Hammond Valve Corporation.
- f. Keystone Valve USA, Inc.
- g. Milwaukee Valve Company, Inc.
- h. NIBCO Inc.
- i. Red-White Valve Corp.
- j. Stockham Valves & Fittings, Inc.
- k. Tyler Pipe.
- I. Ultraflo Corporation.
- m. Victaulic Company of America.
- 6. Swing Check Valves:
 - a. Cla-Val Co.
 - b. Crane Company; Valves and Fitting Division.
 - c. Hammond Valve Corporation.
 - d. Kitz Corp. of America.
 - e. Lunkenheimer/Cincinnati Valve Co.
 - f. Milwaukee Valve Company, Inc.
 - g. NIBCO Inc.
 - h. Powell: Wm. Powell Company (The).
 - i. Red-White Valve Corp.
 - j. Stockham Valves & Fittings, Inc.
 - k. Victaulic Company of America.
- 7. Wafer Check Valves:
 - a. Cla-Val Co.
 - b. Conbraco Industries, Inc.; Apollo Division.
 - c. Hammond Valve Corporation.
 - d. Keystone Valve USA, Inc.
 - e. Kitz Corp. of America.
 - f. Metraflex Company.
 - g. Milwaukee Valve Company, Inc.
 - h. NIBCO Inc.
 - i. Red-White Valve Corp.
 - j. Stockham Valves & Fittings, Inc.
 - k. Tyler Pipe.
 - I. Val-Matic Valve & Mfg. Corp.
 - m. Victaulic Company of America.
- 8. Lift Check Valves:
 - a. Crane Company; Valves and Fitting Division.
 - b. Kitz Corp. of America.
 - c. Milwaukee Valve Company, Inc.
 - d. NIBCO Inc.
 - e. Powell: Wm. Powell Company (The).
 - f. Red-White Valve Corp.
 - g. Stockham Valves & Fittings, Inc.

2.2 BASIC, COMMON FEATURES

A. Design: Rising stem or rising outside screw and yoke stems, except as specified below.

- 1. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Use specified operators and handwheels, except provide the following special operator features:
 - 1. Handwheels: For valves other than guarter turn.
 - 2. Lever Handles: For quarter-turn valves 6 inches and smaller, except for plug valves, which shall have square heads. Furnish Owner with 1 wrench for every 10 plug valves.
 - 3. Chain-Wheel Operators: For valves 4 inches and larger, installed 96 inches or higher above finished floor elevation.
 - 4. Gear-Drive Operators: For quarter-turn valves 8 inches and larger.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
- G. Threads: ASME B1.20.1.
- H. Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.
- I. Solder Joint: ASME B16.18.
 - 1. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.3 GATE VALVES

- A. Gate Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi cold working pressure (CWP), or Class 150, 300-psi CWP; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
- B. Gate Valves, 3 Inches and Larger: MSS SP-70, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, teflonimpregnated packing with 2-piece packing gland assembly, flanged end connections; and with castiron handwheel.

2.4 BALL VALVES

- A. Ball Valves, 4 Inches and Smaller: MSS SP-110, Class 150, 600-psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch valves and smaller and conventional port for 3/4-inch valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections:
 - 1. Operator: Steel handwheel.
 - 2. Operator: Vinyl-covered steel lever handle.
 - 3. Operator: Vinyl-covered steel tee handle.

- 4. Operator: Lever operators with lock.
- 5. Stem Extension: For valves installed in insulated piping.
- 6. Memory Stop: For operator handles.

2.5 PLUG VALVES

- A. Plug Valves: MSS SP-78, 175-psi CWP, ASTM A 126 cast-iron body and bonnet, cast-iron plug, Buna N, Viton, or teflon packing, flanged or grooved end connections:
 - 1. Operator: Lever.
 - 2. Operator: Worm and gear with handwheel, sizes 6 inches and larger.
 - 3. Operator: Worm and gear with chain wheel, sizes 6 inches and larger, 96 inches or higher above floor.

2.6 <u>GLOBE VALVES</u>

- A. Globe Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300psi CWP; ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
- B. Globe Valves, 3 Inches and Larger: MSS SP-85, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

2.7 BUTTERFLY VALVES

- A. Butterfly Valves: MSS SP-67, 200-psi CWP, 150-psi maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals, wafer, lug, or grooved style:
 - 1. Disc Type: Nickel-plated ductile iron.
 - 2. Operator for Sizes 2 Inches to 6 Inches: Lever handle with latch lock.

2.8 <u>CHECK VALVES</u>

- A. Swing Check Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300-psi CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections:
- B. Swing Check Valves, 3 Inches and Larger: MSS SP-71, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
- C. Wafer Check Valves: Class 125, 200-psi CWP, ASTM A 126 cast-iron body, bronze disc/plates, stainless-steel pins and springs, Buna N seals, installed between flanges.
- D. Lift Check Valves: Class 125, ASTM B 62 bronze body and cap (main components), horizontal or vertical pattern, lift-type, bronze disc or Buna N rubber disc with stainless-steel holder threaded or soldered end connections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

- A. Install valves as indicated, according to manufacturer's written instructions.
- B. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- C. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- D. Locate valves for easy access and provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. For chain-wheel operators, extend chains to 60 inches above finished floor elevation.
- H. Installation of Check Valves: Install for proper direction of flow as follows:
 - 1. Swing Check Valves: Horizontal position with hinge pin level.
 - 2. Wafer Check Valves: Horizontal or vertical position, between flanges.
 - 3. Lift Check Valve: With stem upright and plumb.

3.3 SOLDERED CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

- D. Open gate and globe valves to fully open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.4 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.5 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.6 VALVE END SELECTION

- A. Select valves with the following ends or types of pipe/tube connections:
 - 1. Copper Tube Size, 2-1/2 Inches and Smaller: Solder ends, except provide threaded ends for heating hot water.
 - 2. Steel Pipe Sizes, 2-1/2 Inches and Smaller: Threaded or grooved end.
 - 3. Steel Pipe Sizes, 3 Inches and Larger: Grooved end or flanged.

3.7 APPLICATION SCHEDULE

- A. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.
- B. Domestic Water Systems: Use the following valve types:

- 1. Gate Valves: Class 125, bronze or cast-iron body to suit piping system.
- 2. Ball Valves: Class 150, 600-psi CWP, with stem extension.
- 3. Plug Valves: Neoprene-faced plug, Buna N packing.
- 4. Globe Valves: Class 125, bronze or cast-iron body to suit piping system, and bronze or teflon disc.
- 5. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or elastomer-coated ductile iron disc; EPDM or Buna N sleeve and stem seals.
- 6. Bronze Swing Check: Class 125, with rubber seat.
- 7. Check Valves: Class 125, swing or wafer type as indicated.
- C. Chilled-Water Systems: Use the following valve types:
 - 1. Gate Valves: Class 150, bronze body; or Class 125, cast-iron body.
 - 2. Ball Valves: Class 150, 600-psi CWP, with stem extension and memory stop.
 - 3. Plug Valves: Buna N packing.
 - 4. Globe Valves: Class 125, bronze body with bronze or teflon disc; or Class 125, cast-iron body.
 - 5. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or elastomer-coated ductile iron disc; EPDM sleeve and stem seals.
 - 6. Check Valves: Class 125, bronze body swing check with rubber seat; Class 125, cast-iron body swing check; Class 125, cast-iron body wafer check; or Class 125, cast-iron body lift check.

3.8 ADJUSTING

A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 15100

METERS AND GAGES - SECTION 15135

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes meters and gages used in mechanical systems.
- B. Related Sections: Division 15 piping Sections contain requirements that relate to this Section.
 - 1. Meters and gages furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Division 15 Sections.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of meter, gage, and fitting specified. Include scale range, ratings, and calibrated performance curves, certified where indicated.
- C. Product certificates signed by manufacturers of meters and gages certifying accuracies under specified operating conditions and compliance with specified requirements.
- D. Maintenance data to include in the "Operating and Maintenance Manuals".
 - 1. Test plugs.
 - 2. Flow measuring systems.
 - 3. Flow meters.

1.4 QUALITY ASSURANCE

- A. Comply with applicable portions of American Society of Mechanical Engineers (ASME) and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gages.
- B. Design Criteria: The Drawings indicate types, sizes, capacities, ranges, profiles, connections, and dimensional requirements of meters and gages and are based on the specific manufacturer types and models indicated. Meters and gages having equal performance characteristics by other manufacturers may be considered, provided that deviations do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality of meters and gages is on the proposer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Liquid-in-Glass Thermometers:
 - a. Marsh Instrument Co.
 - b. Marshalltown Instruments, Inc.
 - c. H.O. Trerice Co.
 - d. Weiss Instruments, Inc.
 - e. Weksler Instruments Corp.
 - 2. Direct-Mounting Filled-System Dial Thermometers:
 - a. Ashcroft Instrument Div. of Dresser Industries.
 - b. Marsh Instrument Co.
 - c. H.O. Trerice Co.
 - d. Weiss Instruments, Inc.
 - e. Weksler Instruments Corp.
 - 3. Bimetal Dial Thermometers:
 - a. Ashcroft by Dresser Industries, Instrument Div.
 - b. Marsh Instrument Co.
 - c. Marshalltown Instruments, Inc.
 - d. Reotemp Instrument Corp.
 - e. Tel-Tru Manufacturing Co., Inc.
 - f. H.O. Trerice Co.
 - g. Weiss Instruments, Inc.
 - h. Weksler Instruments Corp.
 - 4. Insertion Dial Thermometers:
 - a. Ashcroft by Dresser Industries, Instrument Div.
 - b. Reotemp Instrument Corp.
 - c. Tel-Tru Manufacturing Co., Inc.
 - d. H.O. Trerice Co.
 - e. Weiss Instruments, Inc.
 - f. Weksler Instruments Corp.
 - 5. Pressure Gages:
 - a. AMETEK, U.S. Gauge Div.
 - b. Ashcroft by Dresser Industries, Instrument Div.
 - c. Marsh Instrument Co.
 - d. Marshalltown Instruments, Inc.
 - e. H.O. Trerice Co.
 - f. Weiss Instruments, Inc.
 - g. Weksler Instruments Corp.
 - h. WIKA Instruments Corp.
 - 6. Test Plugs:
 - a. Flow Design, Inc.
 - b. MG Piping Products Co.
 - c. Peterson Equipment Co., Inc.

- d. Sisco Co., Spedco, Inc.
- e. H.O. Trerice Co.
- f. Watts Regulator Co.
- 7. Wafer-Orifice-Type Flow Elements:
 - a. ABB Kent-Taylor.
 - b. Armstrong Pumps, Inc.
 - c. Badger Meter, Inc.
 - d. Bell & Gossett by ITT Corp., Fluid Handling Div.
 - e. Meriam Instrument Div., Scott & Fetzer Co.

2.2 THERMOMETERS, GENERAL

- A. Scale Range: Temperature ranges for services listed as follows:
 - 1. Domestic Hot Water: 30 to 240 deg F, with 2-degree scale divisions.
 - 2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.
 - 3. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions.
- B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 LIQUID-IN-GLASS THERMOMETERS

- A. Description: ASTM E 1, liquid-in-glass thermometer.
- B. Case: Die-cast and aluminum-finished in baked-epoxy enamel, glass front, spring secured, 9 inches long.
- C. Adjustable Joint: Finished to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Tube: Red-reading mercury-filled with magnifying lens.
- E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
- F. Stem: Copper-plated, steel, aluminum, or brass for a separable socket of length to suit installation.

2.4 DIRECT-MOUNTING FILLED-SYSTEM DIAL THERMOMETERS

- A. Description: Vapor-actuated universal-angle dial thermometer.
- B. Case: Drawn steel or cast aluminum, with 4-1/2-inch -diameter glass lens.
- C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Thermal Bulb: Copper with phosphor-bronze Bourdon pressure tube.
- E. Movement: Brass, precision geared.
- F. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

G. Stem: Copper-plated steel, aluminum, or brass for a separable socket of length to suit installation.

2.5 BIMETAL DIAL THERMOMETERS

- A. Description: Direct-mounted universal-angle bimetal dial thermometer.
- B. Case: Stainless steel with 5-inch -diameter glass lens.
- C. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
- D. Element: Bimetal coil.
- E. Scale: Satin-faced nonreflective-aluminum with permanently etched markings.
- F. Stem: Stainless steel for separable socket, of length to suit installation.

2.6 INSERTION DIAL THERMOMETERS

- A. Description: Bimetal dial thermometer.
- B. Dial: 1-inch diameter.
- C. Case: Stainless steel.
- D. Stem: Dustproof and leakproof 1/8-inch -diameter tapered-end stem with nominal length of 5 inches.

2.7 THERMOMETER WELLS

- A. Description: Brass or stainless-steel thermometer well.
- B. Pressure Rating: Not less than piping system design pressure.
- C. Stem Length: To extend 2 inches into fluid.
- D. Stem Length: To extend to center of pipe.
- E. Extension for Insulated Piping: 2 inches nominal, but not less than thickness of insulation.
- F. Threaded Cap Nut: With chain permanently fastened to well and cap.

2.8 PRESSURE GAGES

- A. Description: ASME B40.1, Grade A phosphor-bronze Bourdon-tube pressure gage, with bottom connection.
- B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch -diameter glass lens.
- C. Connector: Brass, 1/4-inch.
- D. Scale: White-coated aluminum, with permanently etched markings.

- E. Accuracy: Plus or minus 1 percent of range span.
- F. Range: Conform to the following:
 - 1. Vacuum: 30 inches Hg of vacuum to 15 psig of pressure.
 - 2. Fluids Under Pressure: 2 times operating pressure.

2.9 PRESSURE-GAGE ACCESSORIES

- A. Syphons: 1/4-inch straight coil of brass tubing with threads on each end.
- B. Snubbers: 1/4-inch brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.10 <u>TEST PLUGS</u>

- A. Description: Nickel-plated brass-body test plug in 1/2-inch fitting.
- B. Body: Length as required to extend beyond insulation.
- C. Pressure Rating: 500 psig minimum.
- D. Core Inserts: 2 self-sealing valve types, suitable for inserting a 1/8-inch outside-diameter probe from a dial thermometer or pressure gage.
- E. Core Material: According to the following for fluid and temperature range:
 - 1. Air, Water, Oil, and Gas: 20 to 200 deg F, neoprene rubber.
 - 2. Air and Water: Minus 30 deg to 275 deg F, ethylene-propylene-diene-terpolymer (EPDM) rubber.
- F. Test-Plug Cap: Gasketed and threaded cap, with retention chain.
- G. Test Kit: Provide test kit consisting of 1 pressure gage and gage adapter with probe, 2 bimetal dial thermometers and a carrying case.
- H. Pressure Gage and Thermometer Ranges: Approximately 2 times systems operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAGE APPLICATIONS

A. General: Where indicated, install meters and gages of types, sizes, capacities, and with features indicated.

3.2 METER AND GAGE INSTALLATION, GENERAL

A. Install meters, gages, and accessories according to manufacturers' written instructions for applications where used.

3.3 THERMOMETER INSTALLATION

- A. Install thermometers and adjust vertical and tilted positions.
- B. Install in the following locations and elsewhere as indicated:
 - 1. At inlet and outlet of each hydronic zone.
 - 2. At inlet and outlet of each hydronic boiler and chiller.
 - 3. At inlet and outlet of each hydronic coil in air-handling units and built-up central systems.
 - 4. At inlet and outlet of each hydronic heat exchanger.
 - 5. At inlet and outlet of each hydronic heat recovery unit.
 - 6. At inlet and outlet of each thermal storage tank.
- C. Remote-Reading Dial Thermometers: Install in control panels with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.
- D. Thermometer Wells: Install in vertical position in piping tees where thermometers are indicated.
 - 1. Install wells with stem extending to center of pipe.
 - 2. Fill wells with oil or graphite and secure caps.

3.4 PRESSURE GAGE INSTALLATION

- A. Install pressure gages in piping tee with pressure gage valve located on pipe at most readable position.
- B. Install in the following locations and elsewhere as indicated:
 - 1. At suction and discharge of each pump.
 - 2. At discharge of each pressure-reducing valve.
 - 3. At building water service entrance.
 - 4. At chilled water and condenser water inlets and outlets of chillers.
- C. Pressure Gage Needle Valves: Install in piping tee with snubber. Install syphon instead of snubber for steam pressure gages.

3.5 TEST PLUG INSTALLATION

A. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

3.6 <u>CONNECTIONS</u>

- A. Piping installation requirements are specified in other Division 15 Sections. The Drawings indicate the general arrangement of piping, fittings, and specialties.
- B. Install meters and gages adjacent to machines and equipment to allow servicing and maintenance.

3.7 ADJUSTING AND CLEANING

A. Calibrate meters according to manufacturer's written instructions, after installation.

- B. Adjusting: Adjust faces of meters and gages to proper angle for best visibility.
- C. Cleaning: Clean windows of meters and gages and factory-finished surfaces. Replace cracked and broken windows and repair scratched and marred surfaces with manufacturer's touchup paint.

END OF SECTION 15135

HANGERS AND SUPPORTS - SECTION 15145

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 DEFINITIONS

A. Terminology used in this Section is defined in MSS SP-90.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of hanger and support.
- C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.
- D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- E. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.
- F. Licensed Engineer's hanger and support installation report specified in the "Field Quality Control" Article.

1.5 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators according to AWS D1.1 "Structural Welding Code--Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
- C. NFPA Compliance: Comply with NFPA 13 for hangers and supports used as components of fire protection systems.

- D. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.
 - 1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

- A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.
 - 1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
 - 2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Thermal-Hanger Shield Inserts: 100-psi average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

2.2 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36, steel plates, shapes, and bars, black and galvanized.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.
- C. Washers: ASTM F 844, steel, plain, flat washers.
- D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.
 - 1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Water: Potable.
 - 4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in the Section specifying the equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments

as required to properly support piping from building structure.

- B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.
- C. Install supports with maximum spacings complying with MSS SP-69.
- D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
- E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.
- F. Install concrete inserts in new construction prior to placing concrete.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- I. Support fire protection systems piping independent of other piping.
- J. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.
- M. Insulated Piping: Comply with the following installation requirements.
 - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
 - 2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
 - 3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees and have dimensions in inches not less than the following:

	LENGTH	THICKNESS
NPS (Inches)	(Inches)	(Inches)
1/4 to 3-1/2	12	0.048
4	12	0.060
5 and 6	18	0.060
8 to 14	24	0.075
16 to 24	24	0.105

4. Pipes 8 Inches and Larger: Include wood inserts.

- 5. Insert Material: Length at least as long as the protective shield.
- 6. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.
- B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 <u>PAINTING</u>

- A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizingrepair paint to comply with ASTM A 780.

END OF SECTION 15145

SANITARY WASTE AND VENT PIPING - SECTION 15150

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 <u>SUMMARY</u>

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.
 - 3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 INFORMATIONAL SUBMITTALS

- A. Storm Shelter Only: Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class(es).
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following
 - a. ANACO-Husky.
 - b. Dallas Specialty & Mfg. Co.
 - c. Fernco Inc.
 - d. Matco-Norca, Inc.
 - e. MIFAB, Inc.
 - f. Mission Rubber Company; a division of MCP Industries, Inc.
 - g. Stant.
 - h. Tyler Pipe.
 - 2. Standards: ASTM C 1277 and CISPI 310.

- 3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Heavy-Duty, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ANACO-Husky.
 - b. Clamp-All Corp.
 - c. Dallas Specialty & Mfg. Co.
 - d. MIFAB, Inc.
 - e. Mission Rubber Company; a division of MCP Industries, Inc.
 - f. Stant.
 - g. Tyler Pipe.
 - 2. Standards: ASTM C 1277 and ASTM C 1540.
 - 3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast-Iron, Hubless-Piping Couplings
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MG Piping Products Company.
 - 2. Standard: ASTM C 1277.
 - 3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 DUCTILE-IRON PIPE AND FITTINGS

- A. Ductile-Iron, Mechanical-Joint Piping:
 - 1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 - 3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Ductile-Iron, Push-on-Joint Piping:
 - 1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 - 3. Gaskets: AWWA C111/A21.11, rubber.
- C. Ductile-Iron, Grooved-Joint Piping:

- 1. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.
- 2. Ductile-Iron-Pipe Appurtenances:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Anvil International.
 - 2) Shurjoint Piping Products.
 - 3) Star Pipe Products.
 - 4) Victaulic Company.
 - Grooved-End, Ductile-Iron Fittings: ASTM A 536 ductile-iron castings with dimensions matching AWWA C110/A 21.10 ductile-iron pipe or AWWA C153/A 21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.
 - c. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber center-leg gasket suitable for hot and cold water; and bolts and nuts.

2.5 <u>PVC PIPE AND FITTINGS</u>

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Adhesive Primer: ASTM F 656.
- D. Solvent Cement: ASTM D 2564.

2.6 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
 - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 - 3. Shielded, Nonpressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cascade Waterworks Mfg. Co.
 - 2) Mission Rubber Company; a division of MCP Industries, Inc.
 - b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

- A. Standard: ASTM A 674 or AWWA C105/A 21.5.
- B. Material: high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Sheet or tub].
- D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 02300 "Earthwork."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Storm Shelter Only: Install seismic restraints on piping. Comply with requirements for seismicrestraint devices specified in Section 15073 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
- O. Install steel piping according to applicable plumbing code.
- P. Install aboveground PVC piping according to ASTM D 2665.
- Q. Install underground PVC piping according to ASTM D 2321.
- R. Install engineered soil and waste drainage and vent piping systems as follows:
 - 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
- S. Plumbing Specialties:
 - 1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
- T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- U. Install sleeves for piping penetrations of walls, ceilings, and floors.
- V. Install sleeve seals for piping penetrations of concrete walls and slabs.
- W. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, nonpressure transition couplings.

3.5 VALVE INSTALLATION

- A. General valve installation requirements are specified in Division 15 Section "Valves"
- B. Shutoff Valves:
 - 1. Install gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Install gate valve for piping NPS 2-1/2 and larger.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Storm Shelter Only: Comply with requirements for seismic-restraint devices specified in Section 15073 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in "Hangers and Supports."
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2 : 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5 : 60 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 - 5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2 : 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
- I. Install supports for vertical steel piping every 15 feet.
- J. Install hangers for and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.

- 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- 4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
- K. Install supports for vertical and PVC piping every 48 inches.
- L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 <u>CONNECTIONS</u>

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 **IDENTIFICATION**

A. Identify exposed sanitary waste and vent piping.

3.9 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 48 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.11 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 3. Copper DWV tube, copper drainage fittings, and soldered joints.
 - 4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 5. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- C. Aboveground, soil and waste piping NPS 5 and larger shall be any of the following:

- 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
- 2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
- 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- D. Aboveground, vent piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- E. Aboveground, vent piping NPS 5 and larger shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- F. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil piping;
 - Hubless, cast-iron soil pipe and fittings; [CISPI] [heavy-duty] [cast-iron] hubless-piping couplings; and coupled joints.
 - 3. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- G. Underground, soil and waste piping NPS 5 and larger shall be any of the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; hubless-piping couplings; coupled joints.
 - 3. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

END OF SECTION 15150
MECHANICAL INSULATION - SECTION 15250

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 pipe, duct, and equipment insulation.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "Supports and Anchors" for pipe insulation shields and protection saddles.
 - 2. Division 15 Section "Metal Ductwork" for duct lining.

1.3 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperatures less than 75 deg F.
- D. Thermal resistivity is designated by an r-value that represents the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (r-value) is expressed by the temperature difference in degrees Fahrenheit between the two exposed faces required to cause 1 BTU per hour to flow through 1 square foot at mean temperatures indicated.
- E. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- F. Density: Is expressed in pcf.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or

inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

- 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
- 2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.6 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after testing of piping and duct systems.
- B. Schedule insulation application after installation and testing of heat trace tape.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Glass Fiber:
 - a. CertainTeed Corporation.
 - b. Knauf Fiberglass GmbH.
 - c. Manville.
 - d. Owens-Corning Fiberglas Corporation.
 - e. USG Interiors, Inc. Thermafiber Division.
 - 2. Cellular Glass:
 - a. Pittsburgh Corning Corporation.
 - 3. Flexible Elastomeric Cellular:
 - a. Armstrong World Industries, Inc.
 - b. Halstead Industrial Products.
 - c. IMCOA,
 - d. Rubatex Corporation.
 - 4. Calcium Silicate:
 - a. Manville.
 - b. Owens-Corning Corporation.

2.2 GLASS FIBER

- A. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.
- C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

- 1. Thermal Conductivity: 0.26 Btu x inch/h x sq. ft. x deg F average maximum, at 75 deg F mean temperature.
- 2. Density: 12 pcf average maximum.
- D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets.
 - 1. Thermal Conductivity: 0.32 Btu x inch/h x sq. ft. x deg F average maximum, at 75 deg F mean temperature.
- E. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.
 - 1. Thermal Conductivity: 0.26 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
 - 2. Density: 10 pcf average maximum.
- F. Adhesive: Produced under the UL Classification and Follow-up service.
 - 1. Type: Non-flammable, solvent-based.
 - 2. Service Temperature Range: Minus 20 to 180 deg F.
- G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 CELLULAR GLASS

- A. Material: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.
- B. Facing: ASTM C 921, Type 1, factory-applied, laminated foil, flame-retardant, vinyl facing.
- C. Form: The following as indicated:
 - 1. Blocks: ASTM C 552, Type I.
 - 2. Boards: ASTM C 552, Type IV.
 - 3. Preformed Pipe: ASTM C 552, Type II, Class 2 (jacketed).
 - 4. Special Shapes: ASTM C 552, Type III, in shapes and thicknesses as indicated.
- D. Thermal Conductivity: 0.38 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
- E. Minimum Density: 7 pcf.
- F. Maximum Density: 9.5 pcf.

2.4 FLEXIBLE ELASTOMERIC CELLULAR

- A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
 - 1. Tubular Materials: ASTM C 534, Type I.
 - 2. Sheet Materials: ASTM C 534, Type II.
- B. Thermal Conductivity: 0.30 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.5 CALCIUM SILICATE

- A. Material: ASTM C 533, Type I; inorganic, hydrous calcium silicate, non-asbestos fibrous reinforcement; incombustible.
- B. Form: Molded flat block, curved block, grooved block, and preformed pipe sections as appropriate for surface.
- C. Thermal Conductivity: 0.60 Btu x inch/h x sq. ft. x deg F at 500 deg F.
- D. Dry Density: 15.0 pcf maximum.
- E. Compressive Strength: 60 psi minimum at 5 percent deformation.
- F. Fire Performance Characteristics: Provide materials identical to those whose fire performance characteristics have been determined, per test method indicated below, by UL or other testing and inspecting organization acceptable to authorities having jurisdiction.
 - 1. Test Method: ASTM E 84.
 - 2. Flame Spread: 0.
 - 3. Smoke Developed: 0.

2.6 INSULATING CEMENTS

- A. Mineral Fiber: ASTM C 195.
 - 1. Thermal Conductivity: 1.0 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
 - 2. Compressive Strength: 10 psi at 5 percent deformation.
- B. Expanded or Exfoliated Vermiculite: ASTM C 196.
 - 1. Thermal Conductivity: 1.10 Btu x inch/h x sq. ft. x deg F average maximum at 500 deg F mean temperature.
 - 2. Compressive Strength: 5 psi at 5 percent deformation.
- C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.
 - 1. Thermal Conductivity: 1.2 Btu x inch/h x sq. ft. x deg F average maximum at 400 deg F mean temperature.
 - 2. Compressive Strength: 100 psi at 5 percent deformation.

2.7 ADHESIVES

- A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.
- B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:
 - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.

2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.8 JACKETS

- A. General: ASTM C 921, Type 1, except as otherwise indicated.
- B. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
 - 1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
 - 2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.
- C. PVC Jacketing: High-impact, ultra-violet-resistant PVC, 20 mils thick, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Adhesive: As recommended by insulation manufacturer.
- D. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20 mil thick, high-impact, ultra-violet-resistant PVC.
 - 1. Adhesive: As recommended by insulation manufacturer.
- E. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Finish and Thickness: Smooth finish, 0.010 inch thick.
 - 2. Moisture Barrier: 1 mil, heat-bonded polyethylene and kraft paper.
 - 3. Elbows: Preformed 45-degree and 90-degree, short- and long-radius elbows, same material, finish, and thickness as jacket.
- F. Stainless-Steel Jacket: ASTM A 167, Type 304 or 316, 0.10 inch thick, No. 2B finish, and roll stock ready for shop or field cutting and forming to indicated sizes.
 - 1. Moisture Barrier: 1 mil, heat-bonded polyethylene and kraft paper.
 - 2. Elbows: Gore type, for 45-degree and 90-degree elbows in same material, thickness, finish as jackets.
 - 3. Jacket Bands: Stainless steel, Type 304, 3/4 inch wide.

2.9 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd..
 - 1. Tape Width: 4 inches.
 - 2. Cloth Standard: MIL-C-20079H, Type I.
 - 3. Tape Standard: MIL-C-20079H, Type II.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: Type 304, 0.020 inch thick.
 - 2. Galvanized Steel: 0.005 inch thick.
 - 3. Aluminum: 0.007 inch thick.
 - 4. Brass: 0.01 inch thick.
 - 5. Nickel-Copper Alloy: 0.005 inch thick.

- C. Wire: 14 gage nickel copper alloy, 16 gage, soft-annealed stainless steel, or 16 gage, softannealed galvanized steel.
- D. Corner Angles: 28 gage, 1 inch by 1 inch aluminum, adhered to 2 inches by 2 inches kraft paper.
- E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.10 SEALING COMPOUNDS

- A. Vapor Barrier Compound: Water-based, fire-resistive composition.
 - 1. Water Vapor Permeance: 0.08 perm maximum.
 - 2. Temperature Range: Minus 20 to 180 deg F.
- B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.
 - 1. Water Vapor Permeance: 0.02 perm maximum.
 - 2. Temperature Range: Minus 50 to 250 deg F.
 - 3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.
- B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.
 - 1. Follow cement manufacturer's printed instructions for mixing and portions.

3.2 INSTALLATION, GENERAL

- A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.
- B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.
- D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- E. Install insulation with smooth, straight, and even surfaces.
- F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

- G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.
- H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.
- I. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.
- J. Keep insulation materials dry during application and finishing.
- K. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:
 - 1. Fibrous glass ducts.
 - 2. Metal ducts with duct liner.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
 - 5. Flexible connectors for ducts and pipes.
 - 6. Vibration control devices.
 - 7. Testing laboratory labels and stamps.
 - 8. Nameplates and data plates.
 - 9. Access panels and doors in air distribution systems.
 - 10. Fire protection piping systems.
 - 11. Sanitary drainage and vent piping.
 - 12. Drainage piping located in crawl spaces, unless indicated otherwise.
 - 13. Below grade piping.
 - 14. Chrome-plated pipes and fittings, except for plumbing fixtures for the disabled.
 - 15. Piping specialties including air chambers, unions, strainers, check valves, plug valves, and flow regulators.

3.3 PIPE INSULATION INSTALLATION, GENERAL

- A. Tightly butt longitudinal seams and end joints. Bond with adhesive.
- B. Stagger joints on double layers of insulation.
- C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.
- D. Apply insulation with a minimum number of joints.
- E. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - Cover circumferential joints with butt strips, at least 3 inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
 - Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.
 - a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 deg F.

- 4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
- 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
- 6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.
- F. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating. Apply insulation for exterior applications butted tightly to interior insulation ends. Extend metal jacket for exterior insulation outside roof flashing at least 2 inches below top of roof flashing. Seal metal jacket to roof flashing with vapor barrier coating.
- G. Exterior Wall Penetrations: For penetrations of below grade exterior walls, terminate insulation flush with mechanical sleeve seal. Seal terminations with vapor barrier coating.
- H. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer.
- I. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through firerated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer.
- J. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.
- K. Flanges, Fittings, and Valves Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
 - 1. Use same material and thickness as adjacent pipe insulation.
 - 2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
 - 3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
 - 4. Insulate elbows and tees smaller than 3 inches pipe size with premolded insulation.
 - 5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
 - 6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
- L. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in Division 15 Section "Supports and Anchors." For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.
 - 1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 BELOW GROUND PIPE INSULATION INSTALLATION

A. General: The following are additional requirements for insulation applied to piping installed below ground.

- B. Coat bore surfaces of insulation materials with insulating cement of type recommended by insulation manufacturer. Apply enough cement to fill surface cells. Do not use adhesives for this coating.
- C. Secure insulation with a minimum of 2 stainless-steel bands for each section of insulation.
- D. Terminate insulation at anchor blocks.
- E. Apply insulation continuously through sleeves and manholes, except as specified above for exterior wall penetrations.
- F. Finishing: Apply 3 coats of asphaltic mastic to a finish thickness of 3/16 inch over insulation materials. Apply 10 by 10 mesh glass cloth between coats. Overlap edges of glass cloth by 2 inches.

3.5 GLASS FIBER PIPE INSULATION INSTALLATION

- A. Bond insulation to pipe with lagging adhesive.
- B. Seal exposed ends with lagging adhesive.
- C. Seal seams and joints with vapor barrier compound.

3.6 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

- A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.
- B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.
 - 1. Miter cut materials to cover soldered elbows and tees.
 - 2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.7 EQUIPMENT INSULATION INSTALLATION, GENERAL

- A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48 inches.
- B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.
- C. Insulation Thicknesses Greater than 2 Inches: Install insulation in multiple layers with staggered joints.
- D. Bevel insulation edges for cylindrical surfaces for tight joint.
- E. Secure sections of insulation in place with wire or bands spaced at 9 inches centers, except for flexible elastomeric cellular insulation.

- F. Protect exposed corners with corner angles under wires and bands.
- G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
- H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.
- Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16 inch. Install a layer of glass cloth embedded between layers.

3.8 GLASS FIBER EQUIPMENT INSULATION INSTALLATION

- A. Secure insulation with anchor pins and speed washers.
- B. Space anchors at maximum intervals of 18 inches in both directions and not more than 3 inches from edges and joints.
- C. Apply a smoothing coat of insulating and finishing cement to finished insulation.

3.9 FLEXIBLE ELASTOMERIC CELLULAR EQUIPMENT INSULATION INSTALLATION

- A. Install sheets of the largest manageable size.
- B. Apply full coverage of adhesive to the surfaces of the equipment and to the insulation.
- C. Butt insulation joints firmly together and apply adhesive to insulation edges at joints.

3.10 DUCT INSULATION

- A. Install block and board insulation as follows:
 - 1. Adhesive and Band Attachment: Secure block and board insulation tight and smooth with at least 50 percent coverage of adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.
 - Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.
- B. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:
 - 1. Smaller Than 24 Inches: Bonding adhesive applied in 6 inches wide transverse strips on 12 inches centers.
 - 2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
 - 3. Overlap joints 3 inches.
 - 4. Seal joints, breaks, and punctures with vapor barrier compound.

3.11 JACKETS

- A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2 inches laps at longitudinal joints and 3 inch wide butt strips at end joints.
 - 1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.
- B. Exterior Exposed Insulation: Install continuous aluminum jackets and seal all joints and seams with waterproof sealant.
- C. Install metal jacket with 2 inches overlap at longitudinal and butt joints. Overlap longitudinal joints to shed water. Seal butt joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel draw bands 12 inches on center and at butt joints.
- D. Install the PVC jacket with 1 inch overlap at longitudinal and butt joints and seal with adhesive.
- E. Install glass cloth jacket directly over insulation. On insulation with a factory applied jacket, install the glass cloth jacket over the factory applied jacket. Install jacket drawn smooth and tight with a 2 inch overlap at joints. Embed glass cloth between (2) 1/16 inch thick coats of lagging adhesive. Completely encapsulate the insulation with the jacket, leaving no exposed raw insulation.

3.12 FINISHES

A. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation.

3.13 <u>APPLICATIONS</u>

- A. General: Materials and thicknesses are specified in schedules at the end of this Section.
- B. Interior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water. Insulate only roof drain bodies and horizontal rainwater leaders of storm water piping.
 - 3. Domestic hot water.
 - 4. Recirculated hot water.
 - 5. Sanitary drains for fixtures accessible to the disabled.
 - 6. Refrigerant suction.
 - 7. Hydronic piping
- C. Interior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water. Insulate only roof drain bodies and horizontal rainwater leaders of storm water piping.
 - 3. Domestic hot water.
 - 4. Recirculated hot water.
 - 5. Refrigerant suction.
 - 6. Hydronic piping

- 7. Condensate piping
- D. Exterior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water.
 - 3. Refrigerant suction.
 - 4. Hydronic piping (35 to 99 deg F).
- E. Exterior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:
 - 1. Domestic cold water.
 - 2. Storm water.
 - 3. Refrigerant suction.
 - 4. Hydronic piping (35 to 99 deg F).
- F. Equipment: Unless otherwise indicated, insulate the following indoor equipment:
 - 1. Domestic cold water equipment, tanks, and pumps.
 - 2. Domestic hot water equipment, tanks, and water heaters.
 - 3. Low temperature brine equipment, tanks, pumps, and heat exchangers, 0 deg F to 34 deg F.
 - 4. Chilled water equipment, tanks, pumps, and heat exchangers.
 - 5. Heating water equipment, tanks, pumps, and heat exchangers, 100 deg F to 250 deg F.
- G. Duct Systems: Unless otherwise indicated, insulate the following duct systems:
 - 1. Interior concealed supply, return and outside air ductwork.
 - 2. Interior exposed supply, return and outside air ductwork.
 - 3. Exterior exposed supply and return ductwork.
 - 4. Interior exposed and concealed supply fans, air handling unit casings and outside air plenums.

3.14 <u>PIPE INSULATION SCHEDULES</u>

- A. General: Abbreviations used in the following schedules include:
 - 1. Field-Applied Jackets: P PVC, K Foil and Paper, A Aluminum, SS Stainless Steel.
 - 2. Pipe Sizes: NPS Nominal Pipe Size.
- B. Domestic Cold Water, Condensate, and Storm Water All Sizes (Interior): 1/2 inch thick flexible elastomeric insulation. Field-applied jacket is not required.

INTERIOR DOMESTIC HOT WATER AND RECIRCULATED HOT WATER

			VAPOR	FIELD-
PIPE SIZES		THICKNESS	BARRIER	APPLIED
<u>(NPS)</u>	MATERIALS	IN INCHES	REQ'D	JACKET
1/2 TO 1	FLEXIBLE ELASTOMERIC	1.0	NO	NONE
1-1/4 TO 6	FLEXIBLE ELASTOMERIC	1.5	NO	NONE

SANITARY DRAINS AND TRAPS EXPOSED AT FIXTURES FOR DISABLED - REFERENCE PLUMBING PLANS.

INTERIOR REFRIGERANT SUCTION AND DUAL-TEMP CHILLED/HOT WATER (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS	VAPOR BARRIER <u>REQ'D</u>	FIELD- APPLIED JACKET
1/2 TO 1-1/4	FLEXIBLE ELASTOMERIC	1	YES	NONE
1-1/2 TO 4	FLEXIBLE ELASTOMERIC	1	YES	NONE

EXTERIOR REFRIGERANT SUCTION AND DUAL-TEMP HYDRONIC AND CHILLED/HOT WATER (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER <u>REQ'D</u>	FIELD- APPLIED JACKET
1/2 TO	GLASS FIBER	2	YES	(A)
1-1/4	FLEXIBLE ELASTOMERIC	1	YES	NONE
1-1/2 TO 8	GLASS FIBER	2-1/2	YES	(A)
	FLEXIBLE ELASTOMERIC	1	YES	NONE

3.15 EQUIPMENT INSULATION SCHEDULES

INTERIOR EXPOSED DOMESTIC COLD WATER EQUIPMENT, TANKS, AND PUMPS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER <u>REQ'D</u>	FIELD- APPLIED <u>JACKET</u>
FLEXIBLE	SHEET	1	YES	NONE

3.16 DUCT SYSTEMS INSULATION SCHEDULE - REFERENCE HVAC PLANS, HVAC NOTES

END OF SECTION 15250

WATER DISTRIBUTION PIPING - SECTION 15411

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 water distribution piping from locations indicated to fixtures and equipment inside building.

1.3 DEFINITIONS

- A. Water Service Piping: Water piping outside building that conveys water to building.
- B. Service Entrance Piping: Water piping at entry into building between water service piping and water distribution piping.
- C. Water Distribution Piping: Water piping inside building that conveys water to fixtures and equipment throughout the building.
- D. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Combined Fire-Protection and Domestic, Service Entrance Piping: 250 psig.
 - 2. Service Entrance Piping: 160 psig.
 - 3. Water Distribution Piping: 125 psig.

1.5 SUBMITTALS

A. Water Samples, Test Results, and Reports: Specified in "Field Quality Control" and "Cleaning" articles.

1.6 QUALITY ASSURANCE

- A. Provide listing/approval stamp, label, or other marking on piping made to specified standards.
- B. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water piping components. Include marking "NSF-pw" on plastic potable-water piping.
- D. Comply with NSF 61, "Drinking Water System Components--Health Effects," Sections 1 through 9 for potable-water piping and components.

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

- A. General: Applications of the following pipe and tube materials are indicated in Part 3 "Piping Applications" Article.
- B. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.
- C. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.
- D. Ductile-Iron Pipe: AWWA C151, 250-psig minimum pressure rating with mechanical- or push-onjoint bell, plain spigot end, and AWWA C104 cement-mortar lining. Include AWWA C111 ductileiron gland, rubber gasket, and steel bolts with mechanical-joint pipe. Include AWWA C111 rubber gasket with push-on-joint pipe.
- E. Galvanized Steel Pipe: ASTM A 53, Type E or S, Grade A or B, Schedule 40.
- F. Galvanized, Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 or ASTM A 106, Schedule 40, seamless, steel pipe.
- G. PVC Plastic Pipe: ASTM D 1785, Schedules 40 and 80.

2.2 PIPE AND TUBE FITTINGS

- A. Copper, Solder-Joint Pressure Fittings: ASME B16.18 cast-copper alloy or ASME B16.22 wrought copper.
- B. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions: ASME B16.18, cast-copper-alloy, hexagonal-stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends. Include threads conforming to ASME B1.20.1 on threaded ends.
- E. Ductile-Iron, Mechanical- or Push-on-Joint Fittings: AWWA C110, ductile- or gray-iron standard pattern; or AWWA C153, ductile-iron compact pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining. Include AWWA C111 ductile- or gray-iron glands, rubber gaskets, and steel bolts with mechanical-joint fittings. Include AWWA C111 rubber gaskets with push-on-joint fittings.
- F. Ductile-Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical-joint ends conforming to AWWA C110 or AWWA C153. Include 2 gasketed ball-joint sections, 1 or more gasketed sleeve sections, 250-psig minimum working-pressure rating, and AWWA C550 epoxy interior coating. Assemble components for offset and expansion indicated. Include AWWA C111 ductile-iron glands, rubber gaskets, and steel bolts.

- G. Ductile-Iron Deflection Fittings: Compound coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends conforming to AWWA C110 or AWWA C153. Include 250-psig minimum working-pressure rating and AWWA C104 cement-mortar lining or AWWA C550 epoxy interior coating. Include AWWA C111 ductile-iron glands, rubber gaskets, and steel bolts.
- H. Ductile-Iron Expansion Joints: 3-piece assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections conforming to AWWA C110 or AWWA C153. Include 250-psig minimum working-pressure rating and AWWA C104 cement-mortar lining or AWWA C550 epoxy interior coating. Select and assemble components for expansion indicated. Include AWWA C111 ductile-iron glands, rubber gaskets, and steel bolts.
- I. Ductile-Iron Flanged Fittings: AWWA C110, ductile- or gray-iron standard pattern; with 250-psig minimum pressure rating and AWWA C104 cement-mortar lining.
- J. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket joint, metal-to-metal bronze seating surfaces, and female threaded ends with threads according to ASME B1.20.1. Furnish Class 300 unions if required to match piping.
- K. Cast-Iron, Threaded Flanges: ASME B16.1, Class 125. Furnish Class 250 flanges if required to match piping.
- L. Schedule 40, PVC Socket Fittings: ASTM D 2466.

2.3 JOINING MATERIALS

- A. General: Applications of the following piping joining materials are indicated in Part 3 "Piping Applications" Article.
- B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for commonly used joining materials.
- C. Solder: ASTM B 32, Alloy Sn95, Sn94, or E; lead free.
- D. Brazing Filler Metal: AWS A5.8, BCuP, copper phosphorus or BAg, silver classification.
- E. Transition Couplings: Coupling or other manufactured fitting same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

2.4 POLYETHYLENE ENCASEMENT

A. Polyethylene Encasement for Ductile-Iron Piping: ASTM A 674 or AWWA C105 polyethylene film, 0.008-inch minimum thickness, tube or sheet.

2.5 <u>VALVES</u>:

- A. Refer to Division 15 Section "Valves" for general-duty valves.
- B. Refer to Division 15 Section "Plumbing Specialties" for special-duty valves.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground piping, unless otherwise indicated.
- C. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.
- D. Underground, Service Entrance Piping: Do not use flanges or valves underground. Use the following:
 - 1. 4- to 8-Inch NPS: Ductile-iron pipe and fittings, and mechanical or push-on joints.
- E. Aboveground, Water Distribution Piping: Use the following:
 - 1. 1-1/2-Inch NPS and Smaller: Hard copper tube, Type L; copper, solder-joint fittings; and soldered joints.
 - 2. 2-Inch NPS: Hard copper tube, Type L; copper, solder-joint fittings; and soldered joints.
 - 3. 2-1/2- to 3-1/2-Inch NPS: Hard copper tube, Type L; copper, solder-joint fittings; and soldered joints.
 - 4. 4- to 6-Inch NPS: Flanged, ductile-iron pipe and flanged, ductile-iron fittings.
 - 5. 8-Inch NPS: Flanged, ductile-iron pipe and flanged, ductile-iron fittings.
- F. Underground, Water Distribution Piping: Do not use flanges or valves underground. Use the following:
 - 1. 2-Inch NPS and Smaller: Soft copper tube, Type L; wrought-copper, solder-joint pressure fittings; and soldered joints.
 - 2. 2-1/2- to 4-Inch NPS: Hard copper tube, Type L; wrought-copper, solder-joint pressure fittings; and soldered joints.

3.2 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use gate, ball, or butterfly valves.
 - 2. Throttling Duty: Use globe, ball, or butterfly valves.
- B. Grooved-end butterfly valves may be used with grooved-end piping.

3.3 PIPING INSTALLATION, GENERAL

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

3.4 SERVICE ENTRANCE PIPING INSTALLATION

- A. Extend service entrance piping to exterior water service piping in sizes and locations indicated for service entrances into building.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each service entrance pipe.

- C. Install water-pressure regulators downstream from shutoff valves. Refer to Division 15 Section "Plumbing Specialties" for water-pressure regulators.
- D. Ductile-Iron, Service Entrance Piping: Comply with AWWA C600. Install buried piping between shutoff valve and connection to water service piping with restrained joints. Anchor pipe to wall or floor at entrance. Include thrust-block supports at vertical and horizontal offsets.
 - 1. Encase piping with polyethylene film according to ASTM A 674 or AWWA C105.
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service entrance pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.
- F. Install wall penetration system at each service entrance pipe penetration through foundation wall. Make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for wall penetration systems.

3.5 WATER DISTRIBUTION PIPING INSTALLATION

- A. Install piping level without pitch.
- B. Fitting Option for Hard Copper Tube: Mechanically formed tee-branch outlets may be used instead of tee fittings.

3.6 JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Mechanically Formed Outlets: Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube, drill pilot hole, form collar for outlet, dimple tube forming seating stop, and braze branch tube into collar.
- C. Grooved Joints: Assemble joints with coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

3.7 ROUGHING-IN FOR WATER METERS

A. Rough-in water piping and install water meters according to utility company's requirements. Water meters will be furnished by utility.

3.8 VALVE INSTALLATION

- A. Sectional Valves: Install sectional valves close to main on each branch and riser serving plumbing fixtures or equipment, and where indicated. Use ball valves for piping 2-inch NPS and smaller. Use gate or butterfly valves for piping 2-1/2-inch NPS and larger.
- B. Shutoff Valves: Install shutoff valve on each water supply to equipment, on each supply to plumbing fixtures without supply stops, and where indicated. Use ball valves for piping 2-inch NPS and smaller. Use gate or butterfly valves for piping 2-1/2-inch NPS and larger.

- C. Drain Valves: Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.

3.9 HANGER AND SUPPORT INSTALLATION

- A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:
 - 1. Riser clamps, MSS Type 8 or Type 42, for vertical runs.
 - 2. Adjustable steel clevis hangers, MSS Type 1, for individual, straight, horizontal runs 100 feet and less.
 - 3. Adjustable roller hangers, MSS Type 43, for individual, straight, horizontal runs longer than 100 feet.
 - 4. Spring cushion rolls, MSS Type 49, if indicated, for individual, straight, horizontal runs longer than 100 feet.
 - 5. Pipe rolls, MSS Type 44, for multiple, straight, horizontal runs 100 feet or longer. Support pipe rolls on trapeze.
 - 6. Spring hangers, MSS Type 52, for supporting base of vertical runs.
- B. Install supports according to Division 15 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:
 - 1. 3/4-Inch NPS and Smaller: Maximum horizontal spacing, 60 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 2. 1-Inch NPS: Maximum horizontal spacing, 72 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 3. 1-1/4-Inch NPS: Maximum horizontal spacing, 72 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 4. 1-1/2 and 2-Inch NPS: Maximum horizontal spacing, 96 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 5. 2-1/2-Inch NPS: Maximum horizontal spacing, 108 inches with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 6. 3-Inch NPS: Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 7. 3-1/2-Inch NPS: Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 8. 4- and 5-Inch NPS: Maximum horizontal spacing, 10 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 9. 6-Inch NPS: Maximum horizontal spacing, 10 feet with 5/8-inch minimum rod diameter; maximum vertical spacing, 10 feet.
 - 10. 8-Inch NPS: Maximum horizontal spacing, 10 feet with 3/4-inch minimum rod diameter; maximum vertical spacing, 10 feet.
- F. Install hangers for steel and ductile-iron piping with the following maximum spacing and minimum rod diameters:

- 1. 1-1/4-Inch NPS and Smaller: Maximum horizontal spacing, 84 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 2. 1-1/2-Inch NPS: Maximum horizontal spacing, 108 inches with 3/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 3. 2-Inch NPS: Maximum horizontal spacing, 10 feet with 3/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 4. 2-1/2-Inch NPS: Maximum horizontal spacing, 11 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 5. 3- and 3-1/2-Inch NPS: Maximum horizontal spacing, 12 feet with 1/2-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 6 4- and 5-Inch NPS: Maximum horizontal spacing, 12 feet with 5/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 7 6-Inch NPS: Maximum horizontal spacing, 12 feet with 3/4-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- 8 8- through 12-Inch NPS: Maximum horizontal spacing, 12 feet with 7/8-inch minimum rod diameter; maximum vertical spacing, 15 feet.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.10 CONNECTIONS

- A. Connect service entrance piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.
- B. Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:
 - 1. Booster Systems: Connect cold-water suction and discharge piping.
 - 2. Water Heaters: Connect cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - Plumbing Fixtures: Connect hot- and cold-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
 - 4. Equipment: Connect hot- and cold-water supply piping as indicated. Provide shutoff valve and union for each connection. Use flanges instead of unions for connections 2-1/2-inch NPS and larger.

3.11 FIELD QUALITY CONTROL

- A. Inspect service entrance piping and water distribution piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - a. Roughing-In Inspection: Arrange for inspection of piping before concealing or closingin after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

- B. Test service entrance piping and water distribution piping as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
 - 3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.

3.12 CLEANING

- A. Clean and disinfect potable service entrance piping and water distribution piping as follows:
 - 1. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, procedure described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1. Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for 3 hours.
 - c. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.
- B. Prepare and submit reports for purging and disinfecting activities.
- C. Clean interior of piping system. Remove dirt and debris as work progresses.

3.13 COMMISSIONING

- A. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.
- B. Perform the following steps before putting into operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.

4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

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- 5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
- 6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.
- C. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.
- D. Check plumbing specialties and verify proper settings, adjustments, and operation.
 - 1. Water-Pressure Regulators: Set outlet pressure at 80 psig maximum, unless otherwise indicated.
- E. Energize pumps and verify proper operation.

END OF SECTION 15411

PLUMBING SPECIALTIES - SECTION 15430

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 plumbing specialties for water distribution systems; soil, waste, and vent systems; and storm drainage systems.
- B. Products installed but not furnished under this Section include water meters that will be furnished by the utility company to the site and ready for installation.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working pressure ratings, except where otherwise indicated:
 - 1. Water Distribution Systems, Below Ground: 150 psig.
 - 2. Water Distribution Systems, Above Ground: 125 psig.
 - 3. Soil, Waste, and Vent Systems: 10 foot head of water.
 - 4. Storm Drainage Systems: 10 foot head of water.
 - 5. Sanitary Sewage, Pumped Piping Systems: 75 psig.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Submit product data including rated capacities of selected models and weights (shipping, installation, and operation). Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following plumbing specialty products:
 - 1. Backflow preventers.
 - 2. Water pressure regulators.
 - 3. Strainers.
 - 4. Hose bibbs, wall hydrants, and post and sanitary hydrants.
 - 5. Drain valves.
 - 6. Water hammer arresters.
 - 7. Trap seal primer valves.
 - 8. Cleanouts, cover plates, and access panels.
 - 9. Floor drains, open receptors, trench drains, and roof drains.
 - 10. Sleeve penetration systems.
- C. Maintenance data for inclusion in Operating and Maintenance manuals as specified in Division 1 Section "Project Closeout" for the following:

- 1. Backflow preventers.
- 2. Water pressure regulators.
- 3. Backwater valves.
- 4. Grease interceptors, grease recovery units, oil interceptors and oil storage tanks, and solids interceptors.

1.5 QUALITY ASSURANCE

- A. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
- B. Electrical Component Standard: NFPA 70, "National Electrical Code."
- C. Listing and Labeling: Provide equipment that is listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. Design Concept: The Drawings indicate capacities, sizes, and dimensional requirements of system components. Components having equal performance characteristics that deviate from the indicated size and dimensions may be considered, provided deviations do not change the design concept or intended performance. The burden of proof for equality of products is on the Contractor. Refer to Division 1 Section "Product Substitutions."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Backflow Preventers:
 - a. Ames Co., Inc.
 - b. Cash by A.W. Cash Valve Mfg. Corp.
 - c. Cla-Val Co.
 - d. Conbraco Industries, Inc.
 - e. Febco.
 - f. Hersey Products, Inc., Grinnell Corp.
 - g. Sparco, Inc.
 - h. Watts Regulator Co.
 - 2. Water Pressure Regulators:
 - a. Bermad.
 - b. Cash by A.W. Cash Valve Mfg. Corp.
 - c. Cla-Val Co.
 - d. Conbraco Industries, Inc.
 - e. G A Industries, Inc.
 - f. Honeywell Braukmann.
 - g. Keckley by O.C. Keckley Co.
 - h. Spence Engineering Co., Inc.
 - i. Watts Regulator Co.

- 3. Wall Hydrants and Post Hydrants:
 - a. Ancon, Inc.
 - b. Jones Manufacturing Co., Inc.
 - c. Josam Co.
 - d. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
 - e. Wade Div., Tyler Pipe.
 - f. Watts Regulator Co.
 - g. Woodford Manufacturing Co. Div., WCM Industries, Inc.
- 4. Water Hammer Arresters:
 - a. Amtrol, Inc.
 - b. Ancon, Inc.
 - c. Jones Manufacturing Co., Inc.
 - d. Josam Co.
 - e. Precision Plumbing Products, Inc.
 - f. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
 - g. Sioux Chief Manufacturing Co., Inc.
 - h. Wade Div., Tyler Pipe.
 - i. Watts Regulator Co.
- 5. Trap Seal Primer Valves:
 - a. Ancon, Inc.
 - b. Jones Manufacturing Co., Inc.
 - c. Josam Co.
 - d. Wade Div., Tyler Pipe.
 - e. Watts Regulator Co.
- 6. Sleeve Penetration Systems:
 - a. Proset Systems, Inc.

2.2 BACKFLOW PREVENTERS

- A. General: ASSE Standard, backflow preventers, of size indicated for maximum flow rate indicated and maximum pressure loss indicated.
 - 1. Working Pressure: 150 psig minimum except where indicated otherwise.
 - 2. 2 Inches and Smaller: Bronze body with threaded ends.
 - 3. 2-1/2 Inches and Larger: Bronze, cast-iron, steel, or stainless-steel body with flanged ends.
 - a. Interior Lining: 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 when used in chrome- plated piping system.
 - 6. Strainer on inlet, where strainer is indicated.

- B. Hose Connection Vacuum Breakers: ASSE 1011, nickel plated, with nonremovable and manual drain features, and ASME B1.20.7 garden-hose threads on outlet. Units attached to rough-bronze-finish hose connections may be rough bronze.
- C. Reduced-Pressure-Principle Backflow Preventer: ASSE 1013, consisting of (OS&Y) gate valves on inlet and outlet and strainer on inlet. Include test cocks and pressure-differential relief valve having ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves for continuous pressure application.
 - 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
- D. Double-Check Backflow Prevention Assemblies: ASSE 1015, consisting of shutoff valves on inlet and outlet and strainer on inlet. Include test cocks with 2 positive-seating check valves for continuous pressure application.
 - 1. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.

2.3 WATER PRESSURE REGULATORS

- A. General: ASSE 1003, water pressure regulators, rated for initial working pressure of 150 psig minimum, of size, flow rate, and inlet and outlet pressures indicated. Include integral factory-installed or separate field-installed Y type strainer.
 - 1. 2 Inches and Smaller: Bronze body with threaded ends.
 - 2. Interior Components: Corrosion-resistant materials.
 - 3. Exterior Finish: Polished chrome plate when used in chrome plated piping system.

2.4 MISCELLANEOUS PIPING SPECIALTIES

- A. Piping specialties such as escutcheons, dielectric fittings, sleeves, and sleeve seals are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- B. Strainers: Y pattern, except where otherwise indicated, full size of connecting piping. Include Type 304 stainless-steel screens with 3/64-inch perforations except where other screens are indicated.
 - 1. Pressure Rating: 125 psig minimum steam working pressure except where otherwise indicated.
 - 2. Sizes 2 Inches and Smaller: Bronze body, with female threaded ends.
 - 3. Sizes 2-1/2 Inches and Larger: Cast-iron body, with interior FDA-approved epoxy coating and flanged ends.
 - 4. Y-Type Strainers: Screwed screen retainer with centered blowdown.
 - a. Drain: Pipe plug.
- C. Hose Bibbs: Bronze body, with renewable composition disc, 1/2 or 3/4 inch threaded or solder-joint inlet. Provide ASME B1.20.7 garden-hose threads on outlet and integral or field-installed, nonremovable, drainable, hose-connection vacuum breaker.
 - 1. Finish: Rough brass.
 - 2. Operation: Operating key (handle). Provide 1 operating key.
- D. Wall Hydrants: ASME A112.21.3M or ASSE 1019, nonfreeze, automatic draining, antibackflow type, key operation, with 3/4 or 1 inch threaded or solder-joint inlet, and ASME B1.20.7 gardenhose threads on outlet. Provide 1 operating key.

- 1. Type: Recessed.
- 2. Finish: Nickel bronze.
- E. Post Hydrants: ASME A112.21.3M, nonfreeze, bronze casing, cast-iron or cast-aluminum casing guard, key operation. Provide 1 operating key.
 - 1. Inlet: 3/4 or 1 inch threaded.
 - 2. Outlet: Integral or field-installed, nonremovable and drainable hose-connection vacuum breaker, with outlet conforming to ASME B1.20.7 for garden-hose thread, and tapped drain port in valve housing.
 - 3. Length: As required for installing inlet valve below frost line.
- F. Water Hammer Arresters: ASME A112.26.1M, ASSE 1010, or PDI WH-201, bellows or piston type with pressurized cushioning chamber. Sizes are based on water-supply fixture units, ASME A112.26.1M sizes "A" through "F" and PDI WH-201 sizes "A" through "F."
- G. Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
 - 1. 125 psig minimum working pressure.
 - 2. Bronze body with atmospheric-vented drain chamber.
 - 3. Inlet and Outlet Connections: 1/2 inch threaded, union, or solder joint.
 - 4. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.5 <u>CLEANOUTS</u>

A. General: Size cleanouts as indicated on drawings, or where not indicated, same size as connected drainage piping. Cleanouts larger than 4 inches are not required except where indicated.

2.6 FLOOR DRAINS

- A. General: Size outlets as indicated on Product Data Sheet or drawings.
- B. Floor Drains: ASME A112.21.1M, cast-iron body, with seepage flange and clamping device. Floor drains for installation in floors not having membrane waterproofing may have seepage flange without clamping device. Floor drains for use as area drains in exterior slab on grade may be furnished with anchor flange instead of seepage flange and clamping device. See Product Data Sheet at end of Part 3 of this Section for shape, dimensions, strainer and body top finish, top-loading classification, sump size, and specific features.
- C. Open Drains: Shop- or field-fabricate from ASTM A 74, Service Class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P trap, hub-and-spigot riser section of length to provide depth indicated, and where indicated increaser fitting of size indicated, joined with ASTM C 564 neoprene gaskets. Size P trap as indicated on drawings.
- D. Deep Seal Traps: Cast iron or bronze, with inlet and outlet matching connected piping, cleanout where indicated, and trap seal primer valve connection where indicated.
 - 1. 2 Inches Size: 4 inches minimum water seal.
 - 2. 2-1/2 Inches and Larger: 5 inches minimum water seal.
- E. Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

F. Air Gap Fittings: ASME A112.1.2, cast iron or cast bronze, with fixed air gap, inlet for drain pipe or tube, and threaded or spigot outlet.

2.7 SLEEVE PENETRATION SYSTEMS

- A. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.
 - 1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on 1 end for installation in cast-in-place concrete slabs.

PART 3 - EXECUTION

3.1 <u>PIPING SPECIALTY INSTALLATION</u>

- A. Install backflow preventers of type, size, and capacity indicated, at each water supply connection to mechanical equipment and systems, and to other equipment and systems as indicated. Comply with plumbing code and authority having jurisdiction. Locate in same room as equipment being connected. Install air-gap fitting on units having atmospheric vent connection and pipe relief outlet drain to nearest floor drain. Do not install bypass around backflow preventer.
- B. Install strainers on supply side of each control valve, pressure-regulating valve, and solenoid valve, and where indicated.
- C. Install hose bibbs with integral or field-installed vacuum breaker.
- D. Install wall hydrants with integral or field-installed vacuum breaker.
- E. Install trap seal primer valves with valve outlet piping pitched down toward drain trap a minimum of 1/8 inch per foot (1 percent) and connect to floor drain body, trap, or inlet fitting. Adjust valve for proper flow.
- F. Install cleanouts in above-ground piping and building drain piping as indicated, and where not indicated, according to the following:
 - 1. Size same as drainage piping up to 4 inches size. Use 4 inches size for larger drainage piping except where larger size cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil or waste stack.
- G. Install cleanout deck plates (covers), of types indicated, with top flush with finished floor, for floor cleanouts for piping below floors.
- H. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.
- I. Install flashing flange and clamping device with each stack and cleanout passing through floors having waterproof membrane.
- J. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to the manufacturer's written instructions.

3.2 FLOOR DRAIN INSTALLATION

- A. Install floor drains according to manufacturer's written instructions, in locations indicated.
- B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
- C. Set drain elevation depressed below finished slab elevation as listed below to provide proper floor slope to drain:
 - 1. 60 inches Drain Area Radius: 1/2 inch depression.
 - 2. 10 Foot Drain Area Radius: 3/4 inch depression.
 - 3. 15 Foot Drain Area Radius: 1 inch depression.
 - 4. 20 Foot Drain Area Radius: 1-1/4 inches depression.
 - 5. 25 Foot Drain Area Radius: 1-1/2 inches depression.
- D. Trap drains connected to sanitary building drain.
- E. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- F. Position drains for easy accessibility and maintenance.

3.3 CONNECTIONS

- A. Supply Runouts to Fixtures: Install hot- and cold-water supply piping runouts to fixtures of sizes indicated, but not smaller than required by plumbing code.
- B. Drainage Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but not smaller than required by plumbing code.
- C. Locate drainage piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.
- D. Interceptor Connections: Connect piping, flow control fittings, and accessories as indicated.

3.4 COMMISSIONING

- A. Preparation: Perform the following checks before start-up:
 - 1. Systems tests are complete.
 - 2. Damaged and defective specialties and accessories have been replaced or repaired.
 - 3. There is clear space for servicing of specialties.
- B. Before operating systems, perform these steps:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open valves to full open position.
 - 3. Remove and clean strainers.
 - 4. Verify drainage and vent piping are clear of obstructions. Flush with water until clear.

3.5 ADJUSTING

A. Adjust operation and correct deficiencies discovered during commissioning.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel on procedures related to startup and servicing of interceptors.

3.7 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of day or when work stops.

END OF SECTION 15430

PLUMBING FIXTURES - SECTION 15440

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.
- B. Requirements of the following Division 15 Sections apply to this Section:
 - 1. "Basic Mechanical Requirements."
 - 2. "Basic Mechanical Materials and Methods."

1.2 <u>SUMMARY</u>

- A. This Section includes plumbing fixtures and trim, fittings, and accessories, appliances, appurtenances, equipment, and supports associated with plumbing fixtures.
- B. Products installed but not furnished under this Section include:
 - 1. Owner-supplied fixtures, as indicated.
 - 2. Accessories, appliances, appurtenances, and equipment specified in other sections, requiring plumbing services or fixture-related devices, as indicated.

1.3 **DEFINITIONS**

- A. Accessible: Describes a plumbing fixture, building, facility, or portion thereof that can be approached, entered, and used by physically handicapped people.
- B. Accessory: Device that adds effectiveness, convenience, or improved appearance to a fixture but is not essential to its operation.
- C. Appliance: Device or machine designed and intended to perform a specific function.
- D. Appurtenance: Device or assembly designed to perform some useful function when attached to or used with a fixture.
- E. Equipment: Device used with plumbing fixtures or plumbing systems to perform a certain function for plumbing fixtures but that is not part of the fixture.
- F. Fitting: Fitting installed on or attached to a fixture to control the flow of water into or out of the fixture.
- G. Fixture: Installed receptor connected to the water distribution system, that receives and makes available potable water and discharges the used liquid or liquid-borne wastes directly or indirectly into the drainage system. The term "Fixture" means the actual receptor, except when used in a general application where terms "Fixture" and "Plumbing Fixture" include associated trim, fittings, accessories, appliances, appurtenances, support, and equipment.
- H. Roughing-In: Installation of piping and support for the fixture prior to the actual installation of the fixture.

- I. Support: Device normally concealed in building construction, for supporting and securing plumbing fixtures to walls and structural members. Supports for urinals, lavatories, and sinks are made in types suitable for fixture construction and the mounting required. Categories of supports are:
 - 1. Carrier: Floor-mounted support for wall-mounted water closet, and support fixed to wall construction for wall-hung fixture.
 - 2. Chair Carrier: Support for wall-hung fixture, having steel pipe uprights that transfer weight to the floor.
 - 3. Chair Carrier, Heavy Duty: Support for wall-hung fixture, having rectangular steel uprights that transfer weight to the floor.
 - 4. Reinforcement: Wood blocking or steel plate built into wall construction, for securing fixture to wall.
- J. Trim: Hardware and miscellaneous parts, specific to a fixture and normally supplied with it required to complete fixture assembly and installation.

1.4 <u>SUBMITTALS</u>

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of plumbing fixture specified, including fixture and trim, fittings, accessories, appliances, appurtenances, equipment, supports, construction details, dimensions of components, and finishes.
- C. Wiring diagrams for field-installed wiring of electrically operated units.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of ANSI Standard A117.1, "Buildings and Facilities -- Providing Accessibility and Useability for Physically Handicapped People," and Public Law 90-480, "Architectural Barriers Act, 1968," with respect to plumbing fixtures for the physically handicapped.
- B. Regulatory Requirements: Comply with requirements of ATBCB (Architectural and Transportation Barriers Compliance Board) "Uniform Federal Accessibility Standards (UFAS) - 1985-494-187" with respect to plumbing fixtures for the physically handicapped.
- C. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
 - 1. The terms "listed" and "labeled" shall be as defined in the National Electrical Code, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. Design Concept: The drawings indicate types of plumbing fixtures and are based on the specific descriptions, manufacturers, models, and numbers indicated. Plumbing fixtures having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions, operation, color or finish, or other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. Burden of proof for equality of plumbing fixtures is on the proposer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver plumbing fixtures in manufacturer's protective packing, crating, and covering.
- B. Store plumbing fixtures on elevated platforms in a dry location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products in each category, by one of the following listed for that category:
 - 1. Water Closets:
 - a. American Standard, Inc.
 - b. Crane Plumbing/Fiat Products.
 - c. Eljer; A Household International Co.
 - d. Kohler Co.
 - 2. Urinals:
 - a. American Standard, Inc.
 - b. Crane Plumbing/Fiat Products.
 - c. Eljer; A Household International Co.
 - d. Kohler Co.
 - 3. Lavatories:
 - a. Acorn Engineering Co.
 - b. American Standard, Inc.
 - c. Crane Plumbing/Fiat Products.
 - d. Eljer; A Household International Co.
 - e. Just Manufacturing Co.
 - f. Kohler Co.
 - 4. Sinks:
 - a. American Standard, Inc.
 - b. Crane Plumbing/Fiat Products.
 - c. Eljer; A Household International Co.
 - d. Elkay Manufacturing Co.
 - e. Just Manufacturing Co.
 - f. Kohler Co.
 - 5. Service Sinks:
 - a. Acorn Engineering Co.
 - b. American Standard, Inc.
 - c. Crane Plumbing/Fiat Products.
 - d. Eljer; A Household International Co.
 - e. Elkay Manufacturing Co.
 - f. Just Manufacturing Co.
 - g. Kohler Co.

- 6. Mop Basins:
 - a. Aqua Glass Corp.
 - b. Crane Plumbing/Fiat Products.
 - c. Florestone Products Co., Inc.
 - d. Stern-Williams Co., Inc.
 - e. Swan Corp.
 - f. Fiat
- 7. Showers:
 - a. Aqua Glass Corp.
 - b. Aquarius Div.; Briggs Industries, Inc.
 - c. Crane Plumbing/Fiat Products.
 - d. Eljer; A Household International Co.
 - e. Kohler Co.
- 8. Water Coolers:
 - a. Elkay Manufacturing Co.
 - b. Halsey Taylor; A Household International Co.
 - c. Haws Drinking Faucet Co.
 - d. Sunroc Corp.
 - e. Western Drinking Fountains; Sunroc Corp.
 - f. Oasis
- 9. Outlet Boxes:
 - a. Guy Gray Manufacturing Co., Inc.
 - b. Symmons Industries, Inc.
- 10. Toilet Seats:
 - a. Bemis Mfg. Co.
 - b. Beneke Div.; Sanderson Plumbing Products, Inc.
 - c. Church Seat Co.
 - d. Kohler Co.
- 11. Flushometers:
 - a. Zurn
 - b. American Standard, Inc.
 - c. Toto
- 12. Commercial/Industrial Cast-Brass Faucets:
 - a. Zurn
 - b. Delta
 - c. Kohler Co.
- 13. Commercial/Residential Cast-Brass and Cast-Brass Underbody Faucets:
 - a. Zurn
 - b. Delta Faucet Co.; Div. of Masco Corp.
 - c. Kohler Co.
- 14. Pressure Balance Bath/Shower Faucets:
 - a. American Standard, Inc.
 - b. Bradley Corp.
 - c. Chicago Faucet Co.
 - d. Delta Faucet Co.; Div. of Masco Corp.
 - e. Eljer; A Household International Co.
 - f. Elkay Manufacturing Co.
 - g. Kohler Co.
 - h. Lawler Manufacturing Co., Inc.
 - i. Leonard Valve Co.
 - j. Powers Process Controls; A Unit of Mark Controls Corp.
 - k. Speakman Co.
 - I. Symmons Industries, Inc.
 - m. Valley Faucets Div.; U.S. Brass.
- 15. Shower Receptors:
 - a. Aqua Glass Corp.
 - b. Crane Plumbing/Fiat Products.
 - c. Florestone Products Co., Inc.
 - d. Stern-Williams Co., Inc.
 - e. Swan Corp.
- 16. Miscellaneous Fittings (Except Faucets):
 - a. Aquaflo Corp.
 - b. Beaton & Corbin Mfg. Co.
 - c. Brass Craft Subsidiary; Masco Co.
 - d. Bridgeport Plumbing Products, Inc.
 - e. Central Brass Manufacturing Co.
 - f. Chicago Faucet Co.
 - g. Connecticut Stamping & Bending Co.
 - h. Crane Plumbing/Fiat Products.
 - i. Eljer; A Household International Co.
 - j. Kohler Co.
 - k. McGuire Manufacturing Co., Inc.
 - I. Royal Brass Mfg. Co.
 - m. T & S Brass and Bronze Works, Inc.
- 17. Supports:
 - a. Josam Co.
 - b. Smith (Jay R.) Mfg. Co.
 - c. Wade Div.; Tyler Pipe.

2.2 PLUMBING FIXTURES, GENERAL

A. Provide plumbing fixtures and trim, fittings, other components, and supports as specified.

2.3 FAUCETS

A. Faucets General: Unless otherwise specified, provide faucets that are cast brass with polished chrome-plated finish.

B. Shower Faucet: ASME A112.18.1M, cast-brass combination single-lever, pressure-balancing mixing valve and escutcheon, and shower head, arm, and flange. Polished chrome-plated finish on all exposed metal.

2.4 FITTINGS, EXCEPT FAUCETS

- A. Fittings General: Unless otherwise specified, provide fittings fabricated of brass, with a polished chrome plated finish.
- B. Lavatory Supplies and Stops: Wheel handle angle stop, having 1/2 inch NPS inlet with wall flange and 3/8 inch by 12 inches flexible tubing riser outlet.
- C. Lavatory Traps: Cast-brass, 1-1/4 inches NPS adjustable P-trap with cleanout, 0.045-inch wall thickness, tubular waste to wall, and wall flange.
- D. Sink Supplies and Stops: Wheel handle angle stop, having 1/2 inch NPS inlet with wall flange and 1/2 inch by 12 inches flexible tubing riser outlet.
- E. Water Closet Supplies and Stops: Wheel handle angle stop, having 1/2 inch NPS inlet with wall flange and 1/2 inch by 12 inches flexible tubing riser outlet with collar.
- F. Fittings installed concealed inside a plumbing fixture or within wall construction may be without chrome plate finish.
- G. Escutcheons: Polished chrome-plated, sheet steel wall flange with friction clips.

2.5 FLUSHOMETERS

- A. Provide flushometers compatible with fixtures, with features and of consumption indicated.
- B. Construction: Cast-brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, vacuum breaker, and brass lever handle actuation except where other variations are specified. Type shall be diaphragm operation except where other type is specified.
- C. Finish: Exposed metal parts shall be polished chrome-plated, except components installed in a concealed location may be rough brass or unfinished.
- D. Water Closet Flushometers: Furnish with following features.
 - 1. Non-hold-open feature.
 - 2. Furnish flushometers with factory-set or field-adjusted maximum water consumption per cycle:
 - a. Consumption: 1.6 gallons per flushing cycle.
- E. Urinal Flushometers: Furnish with following features.
 - 1. Non-hold-open feature.
 - 2. Furnish flushometers with factory-set or field-adjusted maximum water consumption per cycle:
 - a. Consumption: 1.0 gallons per flushing cycle.

2.6 <u>TOILET SEATS</u>

- A. General: Provide toilet seats compatible with water closets, and of type, color, and features indicated.
- B. Toilet Seats: Extra heavy-duty, commercial/industrial type, elongated, open front, solid plastic, with check hinge.

2.7 PLUMBING FIXTURE SUPPORTS

- A. Supports: ASME A112.6.1M, categories and types as required for wall-hanging fixtures specified, and wall reinforcement.
- B. Support categories are:
 - 1. Carriers: Supports for wall-hanging water closets and fixtures supported from wall construction.
 - 2. Chair Carriers: Supports with steel pipe uprights for wall-hanging fixtures. Urinal chair carriers shall have bearing plates.
 - 3. Reinforcement: 1/4 inch by 6 inches steel plates attached to studs, in wall construction, to secure floor-mounted and special fixtures to wall.
- C. Support Types: Provide support of category specified, of type having features required to match fixture.
- D. Provide supports specified as part of fixture description, in lieu of category and type requirements above.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.
- B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 APPLICATION

- A. Install plumbing fixtures and specified components, in accordance with designations and locations indicated on Drawings.
- B. Install supports for plumbing fixtures in accordance with categories indicated, and of type required:
 - 1. Carriers for following fixtures:
 - a. Wall-hanging fixtures supported from wall construction.
 - 2. Chair carriers for the following fixtures:

- a. Wall-hanging urinals.
- b. Wall-hanging lavatories and sinks.
- c. Wall-hanging drinking fountains and electric water coolers.
- 3. Reinforcement for the following fixtures:
 - a. Floor-mounted lavatories required to be secured to wall.
 - b. Floor-mounted sinks required to be secured to wall.
 - c. Recessed, box-mounted electric water coolers.

3.3 INSTALLATION OF PLUMBING FIXTURES

- A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturers' written installation instructions, roughing-in drawings, and referenced standards.
- B. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.
- C. Install wall-hanging, back-outlet urinals with gasket seals.
- D. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.
- E. Fasten floor-mounted fixtures and special fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.
- F. Fasten wall-mounted fittings to reinforcement built into walls.
- G. Fasten counter-mounting-type plumbing fixtures to casework.
- H. Secure supplies behind wall or within wall pipe space, providing rigid installation.
- I. Set shower receptors and mop basins in leveling bed of cement grout.
- J. Install stop valve in an accessible location in each water supply to each fixture.
- K. Install trap on fixture outlet except for fixtures having integral trap.
- L. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.
- M. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.4 <u>CONNECTIONS</u>

- A. Piping installation requirements are specified in other sections of Division 15. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
 - 1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other sections of Division 15.

2. Install piping connections indicated between appliances and equipment specified in other sections, direct connected to plumbing piping systems.

3.5 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.6 ADJUSTING AND CLEANING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.
- C. Replace washers of leaking and dripping faucets and stops.
- D. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.
- E. Review the data in Operating and Maintenance Manuals.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of fixtures for temporary facilities, except when approved in writing by the Owner.

END OF SECTION 15440

FIRE-SUPPRESSION PIPING - SECTION 15915

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 fire-suppression piping and equipment for the following building systems:
 - 1. Automatic wet-type, Class I, fire-suppression standpipes and branches for sprinklers.
 - 2. Wet-pipe, fire-suppression sprinklers, including piping, valves, specialties, and automatic sprinklers.
- B. Related Sections include the following:
 - 1. Division 16 Section "Fire Alarm Systems" for alarm devices not in this Section.

1.3 **DEFINITIONS**

- A. Hose Connection: Valve with threaded outlet matching fire hose coupling thread for attaching fire hose.
- B. Hose Station: Hose connection, fire hose rack, and fire hose.
- C. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 and NFPA 14 for obtaining approval from authorities having jurisdiction.

1.4 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Design sprinklers and obtain approval from authorities having jurisdiction.
- B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:
 - 1. Include 10 percent margin of safety for available water flow and pressure.
 - 2. Include losses through water-service piping, valves, and backflow preventers.
 - 3. Sprinkler Occupancy Hazard Classifications: As follows:
 - a. Building Service Areas: Ordinary Hazard, Group 1.

- b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- c. General Storage Areas: Ordinary Hazard, Group 1.
- d. Library Stack Areas: Ordinary Hazard, Group 2.
- e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
- f. Office and Public Areas: Light Hazard.
- 4. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500- sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500- sq. ft. area.
 - d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
 - e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
 - f. Special Occupancy Hazard: As determined by authorities having jurisdiction.
- 5. Maximum Protection Area per Sprinkler: As follows:
 - a. Office Space: 225 sq. ft..
 - b. Storage Areas: 130 sq. ft..
 - c. Mechanical Equipment Rooms: 130 sq. ft..
 - d. Electrical Equipment Rooms: 130 sq. ft..
 - e. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.
- C. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

1.6 <u>SUBMITTALS</u>

- A. Product Data: For the following:
 - 1. Pipe and fitting materials and methods of joining for standpipe piping.
 - 2. Pipe and fitting materials and methods of joining for sprinkler piping.
 - 3. Pipe hangers and supports.
 - 4. Valves, including specialty valves, accessories, and devices.
 - 5. Alarm devices. Include electrical data.
 - 6. Air compressors. Include electrical data.
 - 7. Hose connections. Include size, type, and finish.
 - 8. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
- B. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, if applicable.
- C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13.
- D. Maintenance Data: For each type of sprinkler specialty to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.

- B. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer. Base calculations on results of fire-hydrant flow test. Professional Engineer shall be licensed in the State of Alabama. Hydraulic calculations and sprinkler shop drawings shall bear his / her licensure seal with signature and date.
- C. 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 firesuppression piping that are similar to those indicated for this Project in material, design, and extent. Professional Engineer shall be licensed in the State of Alabama. Hydraulic calculations and sprinkler shop drawings shall bear his / her licensure seal with signature and date.
- D. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
 - 2. NFPA 231, "General Storage."

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Architect no fewer than four (4) days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Architect's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Specialty Valves and Devices:
 - a. Badger Fire Protection, Inc.
 - b. Central Sprinkler Corp.
 - c. Firematic Sprinkler Devices, Inc.
 - d. Globe Fire Sprinkler Corp.
 - e. Grinnell Corp.

- f. Reliable Automatic Sprinkler Co., Inc.
- g. Star Sprinkler Corp.
- h. Viking Corp.
- 2. Water-Flow Indicators and Supervisory Switches:
 - a. Gamewell Co.
 - b. Grinnell Corp.
 - c. Pittway Corp.; System Sensor Div.
 - d. Potter Electric Signal Co.
 - e. Reliable Automatic Sprinkler Co., Inc.
 - f. Viking Corp.
 - g. Watts Industries, Inc.; Water Products Div.
- 3. Sprinkler, Drain and Alarm Test Fittings:
 - a. Central Sprinkler Corp.
 - b. Fire-End and Croker Corp.
 - c. Grinnell Corp.
 - d. Victaulic Co. of America.
- 4. Sprinkler, Branch-Line Test Fittings:
 - a. Elkhart Brass Mfg. Co., Inc.
 - b. Fire-End and Croker Corp.
 - c. Smith Industries, Inc.; Potter-Roemer Div.
- 5. Sprinkler, Inspector's Test Fittings:
 - a. Fire-End and Croker Corp.
 - b. G/J Innovations, Inc.
 - c. Triple R Specialty of Ajax, Inc.
- 6. Sprinklers:
 - a. Badger Fire Protection, Inc.
 - b. Central Sprinkler Corp.
 - c. Firematic Sprinkler Devices, Inc.
 - d. Globe Fire Sprinkler Corp.
 - e. Grinnell Corp.
 - f. Reliable Automatic Sprinkler Co., Inc.
 - g. Star Sprinkler Corp.
 - h. Viking Corp.
- 7. Keyed Couplings for Steel Piping:
 - a. Central Sprink, Inc.
 - b. Ductilic, Inc.
 - c. Grinnell Corp.
 - d. National Fittings, Inc.
 - e. Star Pipe Products, Inc.; Star Fittings Div.
 - f. Victaulic Co. of America.
- 8. Keyed Couplings for Ductile-Iron Piping:
 - a. Victaulic Co. of America.

- 9. Keyed Couplings for Copper Tubing:
 - a. Grinnell Corp.
 - b. Victaulic Co. of America.
- 10. Press-Seal Fittings for Steel Piping:
 - a. Victaulic Co. of America.
- 11. Mechanically Formed Tee Outlets:
 - a. T-Drill Industries, Inc.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES AND TUBES

- A. Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 and smaller, and Schedule 30 in NPS 8 and larger.
- B. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller and NFPA 13 specified wall thickness in NPS 6 to NPS 10.
- C. Copper Tube: ASTM B 88, water tube, drawn temper. Tube ends may be factory or field expanded to steel-pipe OD.

2.4 PIPE AND TUBE FITTINGS

- A. Cast-Iron Threaded Flanges: ASME B16.1.
- B. Cast-Iron Threaded Fittings: ASME B16.4.
- C. Malleable-Iron Threaded Fittings: ASME B16.3.
- D. Steel, Threaded Couplings: ASTM A 865.
- E. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.
- F. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.
- G. Steel, Press-Seal Fittings: UL 213 and FM-approved, 175-psig pressure rating; with steel housing, butylene O-rings, and pipe stop; for use with Schedule 5, plain-end, steel pipe. Include UL 45-listed fitting manufacturer's pressure-sealing tools.
- H. Cast-Copper-Alloy Fittings: ASME B16.18.
- I. Wrought-Copper Fittings: ASME B16.22.

J. Copper, Mechanically Formed Tees: Manufacturer's standard written procedure for forming Tbranch outlets with UL 45-listed tools.

2.5 JOINING MATERIALS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for pipe-flange gasket materials and welding filler metals.
- B. Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for drypipe service for couplings for dry piping.
- C. Brazing Filler Metals: AWS A5.8, Classification BCuP-3 or BCuP-4.
- D. Transition Couplings: AWWA C219, sleeve type, or other manufactured fitting the same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

2.6 GENERAL-DUTY VALVES

A. Refer to Division 15 Section "Valves" for gate, ball, butterfly, globe, and check valves not required to be UL listed and FM approved.

2.7 FIRE-PROTECTION-SERVICE VALVES

- A. General: UL listed and FM approved, with minimum 175-psig nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.
- B. Gate Valves, NPS 2 and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.
- C. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
 - 1. Indicator: Visual.
- D. Gate Valves, NPS 2-1/2 and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.
- E. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
- F. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.
- G. Split-Clapper Check Valves, NPS 4 and Larger: UL 312, cast-iron body with rubber seal, bronzealloy discs, and stainless-steel spring and hinge pin.

2.8 SPECIALTY VALVES

- A. Alarm Check Valves: UL 193, 175-psig working pressure; designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
 - 1. Option: Grooved-end connections for use with keyed couplings.
 - 2. Drip Cup Assembly: Pipe drain without valves, and separate from main drain piping.
- B. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.

2.9 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element complying with the following:
 - 1. UL 199, for applications except residential.
 - 2. UL 1767, for early suppression, fast-response applications.
- B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
 - a. Orifice: 1/2 inch, with discharge coefficient K between 5.3 and 5.8.
 - b. Orifice: 17/32 inch, with discharge coefficient K between 7.4 and 8.2.
- C. Sprinkler types, features, and options include the following:
 - 1. Concealed ceiling sprinklers, including cover plate.
 - 2. Extended-coverage sprinklers.
 - 3. Flow-control sprinklers, with automatic open and shutoff feature.
 - 4. Flush ceiling sprinklers, including escutcheon.
 - 5. Institution sprinklers, made with small, breakaway projection.
 - 6. Pendent sprinklers.
 - 7. Pendent, dry-type sprinklers.
 - 8. Quick-response sprinklers.
 - 9. Recessed sprinklers, including escutcheon.
 - 10. Sidewall sprinklers.
 - 11. Sidewall, dry-type sprinklers.
 - 12. Upright sprinklers.
- D. Sprinkler Finishes: Chrome-plated, bronze, and painted.
- E. Special Coatings: Wax, lead, and corrosion-resistant paint.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
 - 2. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch vertical adjustment.
 - 3. Ceiling Mounting: Plastic, white finish, one piece, flat.
 - 4. Sidewall Mounting: Chrome-plated steel, one piece, flat.
 - 5. Sidewall Mounting: Plastic, white finish, one piece, flat.
- G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.10 SPECIALTY SPRINKLER FITTINGS

- A. Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible with piping.
- B. Press-Seal Fittings: UL 213, steel housing with butylene O-rings and pipe stop.
- C. Locking-Lug Fittings: UL 213, ductile-iron body with locking-lug ends.
- D. Mechanical-T Fittings: UL 213, ductile-iron housing with pressure-responsive gasket, bolts, and threaded or locking-lug outlet.
- E. Mechanical-Cross Fittings: UL 213, ductile-iron housing with pressure-responsive gaskets, bolts, and threaded or locking-lug outlets.
- F. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.
- G. Sprinkler, Drain and Alarm Test Fittings: UL-listed, cast- or ductile-iron body; with threaded inlet and outlet, test valve, and orifice and sight glass.
- H. Sprinkler, Branch-Line Test Fittings: UL-listed, brass body; with threaded inlet and capped drain outlet and threaded outlet for sprinkler.
- I. Sprinkler, Inspector's Test Fittings: UL-listed, cast- or ductile-iron housing; with threaded inlet and drain outlet and sight glass.

2.11 ALARM DEVICES

- A. General: Types matching piping and equipment connections.
- B. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig pressure rating; and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

2.12 PRESSURE GAGES

A. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with dial range of 0 to 250 psig.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable thickness, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed. B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PIPING APPLICATIONS

- A. Do not use welded joints with galvanized steel pipe.
- B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- C. Wet-Pipe Sprinklers: Use the following:
 - 1. Sprinkler-Piping Option: Mechanical-T bolted-branch-outlet fittings, NPS 2 and smaller, may be used downstream from sprinkler zone valves.
 - 2. Sprinkler-Piping Option: Specialty sprinkler fittings, NPS 2 and smaller, including mechanical-T fittings, may be used downstream from sprinkler zone valves.
 - 3. NPS 1-1/2 and Smaller: Standard-weight steel pipe with threaded ends, cast- or malleableiron threaded fittings, and threaded joints.
 - 4. NPS 2: Standard-weight steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
 - 5. NPS 2-1/2 to NPS 3-1/2: Standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
 - 6. NPS 2-1/2 to NPS 3-1/2: Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
 - 7. NPS 4: Standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
 - 8. NPS 4: Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.
 - 9. NPS 5 and NPS 6: Standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
 - 10. NPS 5 and NPS 6: Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.

3.3 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use gate valves.
 - 2. General-Duty Valves: For applications where UL-listed and FM-approved valves are not required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use gate, ball, or butterfly valves.
 - b. Throttling Duty: Use globe, ball, or butterfly valves.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

- B. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- C. Copper-Tubing, Grooved Joints: Use copper tube with roll-grooved ends; copper, grooved-end fittings; and copper, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
- D. Brazed Joints: Use AWS A5.8, BCuP-3 or BCuP-4 filler metals.
- E. Mechanically Formed, Copper-Tube-Outlet Joints: Use UL-listed tool and procedure and follow forming equipment manufacturer's written instructions. Drill pilot hole in copper tube, form branch for collar, dimple tube to form seating stop, and braze branch tube into formed-collar outlet.
- F. Press-Seal-Fitting Joints: Use UL-listed tool and procedure and follow fitting manufacturer's written instructions. Include use of specific equipment, pressure-sealing tool, and accessories.
- G. Locking-Lug-Fitting, Twist-Locked Joints: Follow fitting manufacturer's written instructions.
- H. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.

3.5 PIPING INSTALLATION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
- E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
- F. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install drain valves on standpipes.

- J. Install alarm devices in piping systems.
- K. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping.
- L. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
- M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

3.6 SPECIALTY SPRINKLER FITTING INSTALLATION

- A. Install specialty sprinkler fittings according to manufacturer's written instructions.
 - B. Install guards in all exercise areas, football practice facility, wrestling/multi-purpose, weight rooms, locker rooms, locker room restrooms and showers.

3.7 VALVE INSTALLATION

- A. Refer to Division 15 Section "Valves" for installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13 and NFPA 14, manufacturer's written instructions, and authorities having jurisdiction.
- B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
- C. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

3.8 SPRINKLER APPLICATIONS

- A. General: Use sprinklers according to the following applications:
 - 1. Rooms without Ceilings: Pendent sprinklers.
 - 2. Rooms with Suspended Ceilings: Recessed sprinklers.
 - 3. Rooms with Suspended Ceilings: Concealed sprinklers.
 - 4. Wall Mounting: Sidewall sprinklers.
 - 5. Sprinkler Finishes: Use sprinklers with the following finishes:
 - a. Upright, Pendent, and Sidewall Sprinklers: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.
 - b. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - c. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - d. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
 - 6. Secure heads in all secure areas.

3.9 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.

3.10 CONNECTIONS

- A. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.
- B. Electrical Connections: Power wiring is specified in Division 16.
- C. Connect alarm devices to fire alarm.

3.11 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 15 Section "Basic Mechanical Materials and Methods."

3.12 FIELD QUALITY CONTROL

- A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
- B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
- C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.13 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers having paint other than factory finish.

3.14 PROTECTION

A. Protect sprinklers from damage until Substantial Completion.

3.15 COMMISSIONING

- A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- B. Verify that specified tests of piping are complete.
- C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
- D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- E. Fill wet-pipe sprinkler piping with water.

- F. Verify that hose connections are correct type and size.
- G. Energize circuits to electrical equipment and devices.
- H. Adjust operating controls and pressure settings.

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I. Coordinate with fire alarm tests. Operate as required.

3.16 DEMONSTRATION

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with Owner with at least seven days' advance notice.

END OF SECTION 15915

NEW GYMNASIUM FOR: HAMILTON MIDDLE SCHOOL (#22-131)

PROJECT NO. 2343

APRIL 2023

STEWART ENGINEERING, INC. ELECTRICAL CONSULTANTS

PHONE (256) 237-0891

ANNISTON, ALABAMA 36202



ELECTRICAL - SECTION 16000

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. Furnish and install complete Fire Alarm System.
- H. Furnish and install complete Gymnasium Sound System.
- I. 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.
- J. 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. Fire Alarm System
 - 5. Gymnasium Sound System
 - 6. Lighting Control Relay Panels
 - 7. Occupancy Sensors and Switches
 - 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.

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- 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.

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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.

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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.
 - 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 Ballasts

A. Ballasts shall be (General Electric Maxi Miser II or approved equal by Jefferson, Universal or Advance) (electronic, rapid start, parallel wired with total harmonic distortion of less than 20%. Ballast must be approved by E.T.L. and have a noise level rating in accordance with I.E.S. recommendations. Use ballasts approved for the use in fire-rated ceilings. Provide fuse for each individual ballast. (Ballasts shall be by Advance, Motorola or Magnetek).

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2.23 Lamps

- A. Furnish and install 125 volt inside frosted incandescent lamps of proper wattage for all outlets so designated on the drawings. Lamps to be G.E. Company, Sylvania, or Phillips.
- B. Furnish and install fluorescent, mercury vapor and quartz lamps of proper size and type as shown on drawings. Lamps to be G.E. Company, Sylvania or Phillips. (Fluorescent lamps shall be F32T8/SP35 with a minimum CRI of 75.)
- C. All lamps shall be installed new, immediately prior to final inspection, and shall not be used for construction purposes.
- 2.24 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.

2.25 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).
- 2.26 Distribution And Power Panels
 - A. Furnish and install distribution and power panelboards as indicated in the panelboard schedule and where shown on the plans. Panelboards shall be deadfront, safety type equipped with thermal-magnetic, molded case circuit breakers with trip ratings as indicated on the schedule.
 - B. Panelboard bus structure and main lugs or main breaker shall have current rating as indicated on the panelboard schedule. Ratings to be established by heat rise tests conducted according to UL Standard UL67.
 - C. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Permanent circuit identification to be on each breaker. Tripped indication shall be clearly shown by breaker handle taking a position between ON and OFF. Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.

- D. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standards. The size of wiring gutters to be in accordance with UL Standards. Cabinets to be equipped with spring latch and tumbler-lock on door trim. Doors over 48" long shall be equipped with three point latch and vault lock. All locks to be keyed alike. End walls shall be removable. Front locks shall be code gauge, full finished steel with rust-inhibiting primer and baked enamel finish. Each front shall be furnished with a "hinged trim" accessory. A circuit directory frame and card with clear plastic covering shall be provided on the inside of the door. The directory shall be typed to identify the load fed by each circuit. Furnish an engraved micarta plate on front of panel with panel name and rating.
- E. The panelboard interior assembly to be deadfront with panelboard front removed. Main lugs or main breaker shall be barriered on five sides. The barrier in front of the main lugs to be hinged to fixed part of the interior. The end of the bus structure opposite the mains shall be barriered.
- F. Panelboards to be listed by Underwriters' Laboratory and bear UL label. When required, panelboards to be suitable for use as Service Equipment. Panelboards to be by Square D, General Electric, Siemens, or Eaton (Cutler Hammer).
- G. When utilized as Service Entrance Equipment, this panelboard shall be equipped with built-in surge protection.
- 2.27 Fire Alarm System
 - A. General
 - 1. The contractor shall furnish and install complete low voltage, automatic and manual 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, a 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.
 - B. Control Panel

The Contractor shall provide and install new NFS-320 addressable control panel:

1. Notifier Model NFS-320 with receiving and alarm zones per plans and battery standby power, shall provide for the connection of alarm circuits as indicated and shall include functions as follows:

- a. Detect the operation of any signal initiating device.
- b. Indicate on LCD display the device(s) alarming.
- c. Operate all alarm and auxiliary devices.
- C. Fire Alarm Pull Stations

Shall be Notifier Type LNG-1 flush mounted. Stations with two sets of contacts will not be acceptable.

D. Smoke Detectors

Notifier Model 2451 photoelectric smoke detector, dual chamber design shall be installed where shown on plans.

E. Heat Detectors

Model #81 heat detectors, combination fixed temperature and rate of rise, 135 degree F or 190 degree F (Model HD-84), shall be installed where shown on the plans.

F. Signaling Devices

Notifier Model SHG24-1575WR Combination Horn-Lamp unit shall be 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 stobes to operate after system is silenced.

G. Annunciator

Notifier Series LCD-80 Annunciator, flush mounted, shall provide for active zones as required on plans and shall be installed where shown on plans. Designated standard options shall be incorporated in the unit.

Contractor shall install one twisted shielded pair (16 AWG), plus 2#14 THHN, together in 3/4" conduit from Annunciator to FACP.

- H. Remote Station Receiving Panel
 - 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.

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I. Wiring

- 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 provided for devices and power wiring.
- 2. Wiring shall be run in conduit. In general the wiring shall consist of:

From the Control Panel:

- a. 2#14 wires common to all Fire Alarm Stations or Detectors.
- b. 4#14 wires common to each circuit of Fire Alarm Signals.
- J. 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.
- K. Testing, Guarantee And Service
 - 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.

2.28 Gymnasium Sound System

- A. General
 - 1. Description
 - a. The gymnasium sound system shall consist of microphone, amplifier, speaker systems, and accessories required to provide a complete operating system.
 - 2. Substitutions
 - a. Any proposed substitution of equipment or materials from that specified must be approved by the Engineer within ten (10) days prior to the bid date.
 - b. All proposed substitution shall clearly identify the item submitted. Standard catalog sheets shall be marked, in ink, so as to identify which item is to be considered. All drawings submitted must be by factory as field drawings will not be accepted.

B. Products

- 1. Microphones
 - a. The microphones shall be dynamic cardioid type and shall be SHURE SM58-S with 25 ft. cables. Provide two (2) microphones, one (1) ATLAS MS10C floor stands, and two (2) SHURE C25J microphone extension cable.
 - Wireless microphone system shall consist of two (2) TOA WM5270 handheld microphones with two (2) WT5800 receivers. Wireless microphone antennas shall be TOA YW-4500.
- 2. Mixer-Preamplifier
 - a. The digital mixer-preamplifier shall provide eight (8) individually controller inputs, master volume control, bass and treble controls, and color coded calibrated LED level display. The digital mixer-preamplifier shall be TOA M900MK2.
- 3. Digital Signal Processor
 - a. The digital signal processor panel shall include 31-band digital graphic equalizer, feedback controller, and compressor/limiter. The digital signal processor panel shall be SABINE Model GRQ-3121-S-U.
- 4. Power Amplifier
 - a. The power amplifier shall be multi-channel unit and have power output of 550 watts per channel. The power amplifier shall be TOA Model DA-550F-HL.
- 5. CD Player
 - a. The CD player shall be 19 inch rack mounted and shall be DENON DN-C615.
- 6. IPod Docking Panel
 - The iPod docking station shall be rack mounted and shall be RAXXESS Model NA1D1BA.

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- 7. Master Power Panel
 - a. Provide master power control panel which shall control AC power to all amplifier equipment from a single on-off switch. The master AC power panel shall be MIDDLE ATLANTIC PD915R.
- 8. Main Equipment Rack

b.

- a. The equipment rack shall be ATLAS 235-18.
- 9. Speaker Systems
 - a. Speaker systems shall consist of three (3) SOUNDSPHERE Q12A speaker units with HKL mounting kit and TX250 70V transformer.
- 10. Cables
- a. Microphone cable shall be WEST PENN No. 452. Speaker shall be WEST PENN No. 226.
- 11. Guaranty
 - a. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.
 - b. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.
- 12. Certification
 - a. Upon completion of the system(s), the contractor shall provide written certification of the following:
 - 1) That each aspect of the system(s) is complete and is working properly.
 - 2) That each aspect of the system(s) meets the specification outlined in this document.
 - 3) Installation was completed by factory trained technicians.
 - 4) That the system was operated for thirty (30) days without failures or unsatisfactory performance.
 - 5) Warranty statement, including start and termination dates and contact information for service and emergency response.
- 13. Test Equipment
 - a. The contractor shall perform a test, equalization and balance of the sound reinforcement system using the listed test equipment. At the end of the test, the contractor will demonstrate the performance of the system to the satisfaction of the owner's designated representative. The demonstration of the system performance shall be conducted by a qualified systems engineer. The system must be fully operational and with all components properly labeled and identified with engraved nameplates prior to requesting system checkout.
 - b. The contractor shall furnish the following minimum list of test equipment for use during system testing, checkout and equalization:

- 1) One Third Octave Real-Time Analyzer and Reference Microphone: Preamp interface and M30 reference microphone. Alternate products are as manufactured by Goldline, Crown, lvie or approved equal.
- 2) Sound Pressure Level Meter: Bruel and Kjaer, General Radio, or included with RTA.
- Random (Pink) Noise Generator: Goldline, Crown, Ivie or approved equal. Digital RMS Volt-Ohm Meter: Fluke Impedance Meter: Sennheiser ZP-2, ZP-3 or Gold Line ZM1.
- c. All test equipment shall be provided with evidence of factory calibration and verification within one year of use. All batteries, connectors, etc. shall be in good repair and charge state.
- 14. Cleaning
 - a. Clean all equipment of construction dust and debris prior to final acceptance.
 - b. After completing installation of exposed, factory-finished components, inspect exposed finishes and repair damaged finishes.
- 15. Demonstration
 - a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain all equipment. This shall consist of at least one (2) hour training session scheduled at the owner's convenience and shall cover operation of all components and the control systems including a basic seminar on systems operation.

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" - Bottom
Receptacles Over Counters	3'8" - Centerline
Telephone Outlets General	1'4" - Bottom
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" - Bottom

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.

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- 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.

END OF SECTION 16000

PRE-CONSTRUCTION CONFERENCE CHECK-LIST

Project: New Gymnasium for Hamilton High School

Funding: Local / DCM

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:
 - ٠
 - ٠
- D. If applicable, note special material/equipment delivery dates associated with allowances.
 - ٠

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 <u>ALL</u> 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 <u>CANNOT</u> be prepared if all backup paperwork is not provided and accounted for.
- J. This information is required for all contractors, subcontractors, and subsubcontractors.

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. <u>Digital Copies</u>: Provide via email to submittals@lathanassociates.com. Do not send directly to Architect. See attached Sample.
- E. <u>Submittal Preparation:</u>
 - Include the following information on transmittal / email.
 - o Date
 - o Project Name and Architect's Project Number.
 - o Name of the General Contractor and Contact within company.
 - o 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 <u>inspections@lathanassociates.com</u> 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 reinspection 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
 - ✓ Fire Alarm Contractor's Certification (from State Fire Marshal)
 - ✓ ADEM permit, if more than 1 acre of land is disturbed
- Pre-Roofing Conference
 - Required Attendees: Contractor, Owner, Architect, Roofing Subcontractor, Roofing Manufacturer's Representative
 - o 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
 - o 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
 - o Inspection Requirements:
 - ✓ Fire alarm certification
 - ✓ General Contractor's 5-Year Roofing Warranty (ABC Form C-9)
 - General Contractor's 5-Year Roof
 Koofing manufacturer's guaranty
 - ✓ Above ground and below ground sprinkler certifications
 - ✓ Emergency and exit lighting tests
 - ✓ Fire alarm must be monitored
 - 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
 - o 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, underslab, 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 nonoffensive 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 <u>rfi@lathanassociates.com</u> 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: