DeKalb County
Department of Purchasing and Contracting

Maloof Administration Building, 1300 Commerce Drive, 2nd Floor, Decatur, Georgia 30030

April 8, 2019

INVITATION TO BID (ITB) NO. 19-101084
FOR

LOU WALKER SENIOR CENTER CLASSROOM RENOVATION

DEKALB COUNTY, GEORGIA

Procurement Agent:	Jennifer Schofield
Phone:	404.687.4042
Email:	jjschofield@dekalbcountyga.gov
Mandatory DeKalb First LSBE Meeting: (Bidders must attend 1 meeting on either of the dates listed.)	**April 10, 2019** , **April 17, 2019** 4572 Memorial Drive, Decatur, Georgia 30032 Main Conference Room - A (Meetings are held at 10:00 a.m. and 2:00 p.m.) Video Conference: Utilize the link supplied on our webpage labeled "DeKalb First LSBE Video Meeting"
Mandatory Pre-Bid Conference & Site Visit:	**April 30, 2019, 10:00 AM**, Lou Walker Senior Center 2538 Panola Road, Lithonia, GA 30058
Deadline for Submission of Questions:	5:00 P.M. ET, May 1, 2019
Bid Opening:	3:00 P.M. ET, May 10, 2019
Price Schedule Opening:	3 – 5 Business days after Bid Opening

THE RESPONSIBILITY FOR SUBMITTING A RESPONSE TO THIS BID TO THE DEPARTMENT OF PURCHASING AND CONTRACTING OF DEKALB COUNTY GOVERNMENT ON OR BEFORE THE STATED DATE AND TIME WILL BE SOLELY AND STRICTLY THE RESPONSIBILITY OF THE BIDDER.

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ACKNOWLEDGEMENT OF BIDDER

I _____ have had the opportunity to review and have reviewed this Bid Document Package dated _____, 20___ in its entirety and I agree that it is accurate and complete. I_____ am duly and properly in office and I am fully authorized and empowered to execute this Acknowledgement for and on behalf of the Contractor.

By: _____(SEAL)
Signature

_____
Name (Typed or Printed)

_____
Title

_____
Name of Business

_____
Federal Tax I.D. Number

ATTEST:

_____
Signature

_____
Name (Typed or Printed)

_____
Title

ADVERTISEMENT FOR BIDS

DEKALB COUNTY, GEORGIA

INVITATION NUMBER 19-101084

Sealed Bids will be received by DeKalb County, Georgia, in the Department of Purchasing and Contracting, The Maloof Center, 2nd Floor, 1300 Commerce Drive, Decatur, Georgia 30030, until **3:00 p.m. on May 10, 2019**, at which time and place they will be publicly opened and read aloud, for furnishing all labor, materials, equipment, and all things necessary pursuant to Drawings, Specifications, conditions, etc., for Lou Walker Senior Center Classroom Renovation ("the Project"). Bid Price Form shall be opened and read aloud 3 to 5 business days after Bid Opening.

SUBMIT ONE ORIGINAL BID PACKAGE (INCLUSIVE OF THE ENTIRE INVITATION TO BID DOCUMENT AND REQUIRED DOCUMENTS WITH THE EXCEPTION OF THE BID PRICE FORM AND THE BID BOND, PAGES 17-19) STAMPED "ORIGINAL" AND TWO SEALED IDENTICAL COPIES STAMPED "COPY" OF THE BID PACKAGE TO THE ADDRESS LISTED ABOVE.

Contract Documents, Drawings, and Specifications for this Work are on file and open for inspection at the Department of Purchasing and Contracting, The Maloof Center, 2nd Floor, 1300 Commerce Drive, Decatur, Georgia 30030. A complete set of documents may be obtained from: https://www.dekalbcountyga.gov/purchasing-contracting/bids-itb-rfps.

MANDATORY PRE-BID CONFERENCE AND SITE VISIT

A mandatory pre-bid conference and site visit will be held at **10:00 AM. on April 30, 2019** at Lou Walker Senior Center, 2538 Panola Road, Lithonia, GA 30058. Bidders are required to attend and participate in the mandatory pre-bid conference and site visit. Bidders shall sign in at the mandatory pre-bid meeting and site visit as proof of attendance. Only the Bidder or its authorized representative or employee shall sign in at the mandatory pre-bid meeting and site visit. For individual firms planning to bid as a yet to be formed joint venture, a representative from each firm is required to attend and sign in. Failure of a Bidder to attend or sign in at the mandatory pre-bid conference and site visit, will be cause for rejection of Bid. For information regarding the mandatory pre-bid conference and site visit, please contact Jennifer Schofield, Procurement Agent at 404.687.4042 or jjschofield@dekalbcountyga.gov.

QUESTIONS

All questions concerning the Project and requests for interpretation of the solicitation may be asked and answered at the pre-bid conference; however, oral answers are not authoritative. Questions must be submitted to the Department of Purchasing and Contracting in writing via email to jjschofield@dekalbcountyga.gov. Questions and requests for information or clarification concerning the specifications in this ITB must be submitted to the above listed contact person via email no later than the date and time listed in the bid timetable. Questions and requests for interpretation received after the above stated time or sent to anyone other than the listed contact person will not receive a response or be the subject of addenda.

No Bid may be revoked or withdrawn until sixty (60) days after the time set for opening the Bids.

THE COUNTY RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS, TO WAIVE INFORMALITIES IN BIDDING, AND TO READVERTISE.

This 8th day of April, 2019.

DEKALB COUNTY, GEORGIA

By: _____
Jennifer Schofield
Procurement Agent
Department of Purchasing and Contracting

INSTRUCTIONS TO BIDDERS

GENERAL

Sealed Bids will be received by DeKalb County, Georgia, in the Department of Purchasing and Contracting, The Maloof Center, 2nd Floor, 1300 Commerce Drive, Decatur, Georgia 30030, until **3:00 p.m. on May 10, 2019**, for ITB No. 19-101084 according to the Drawings and Specifications entitled Lou Walker Senior Center Classroom Renovation on file in the Department of Purchasing and Contracting, The Maloof Center, 2nd Floor, 1300 Commerce Drive, Decatur, Georgia 30030. Bid Price Forms shall be opened and read aloud 3 to 5 business days after Bid Opening Date. Sealed Bids shall be submitted on the form furnished by the County and shall be submitted in **triplicate**, designated as original or copy. **SUBMIT ONE ORIGINAL BID PACKAGE (INCLUSIVE OF THE ENTIRE INVITATION TO BID DOCUMENT AND REQUIRED DOCUMENTS WITH THE EXCEPTION OF THE BID PRICE FORM AND BID BOND PAGES 17-19) STAMPED "ORIGINAL" AND TWO SEALED IDENTICAL COPIES STAMPED "COPY" OF THE BID PACKAGE TO THE ADDRESS LISTED ABOVE.**

Bids will be considered only from experienced and well-equipped contractors. Prior to beginning construction, the successful Bidder will file with the County a Performance Bond and a Payment Bond, each equal to 100% of the Contract Price, with the terms and surety to be approved by the County; and furnish satisfactory proof of carriage of the insurance required.

SUBMITTING BIDS

Bids are to be submitted on the proper unaltered forms, and shall be addressed to the DeKalb County Department of Purchasing and Contracting, The Maloof Center, 2nd Floor, 1300 Commerce Drive, Decatur, Georgia 30030, sealed, dated and enclosed in an envelope or package appropriately marked on the outside with the name of the Bidder, the date and hour of opening, and the Invitation to Bid Number and Project Name.

FAILURE TO SUBMIT THE BID PRICE AND BID BOND FORM (PAGES 17-19) IN A SEPARATE SEALED ENVELOPE SHALL DEEM THE BID NON-RESPONSIVE. INCLUDING THE PRICE SCHEDULE IN ANY AREA OUTSIDE

OF ITS SEPARATE, SEALED ENVELOPE WILL RESULT IN BIDDER'S BID BEING DEEMED NON-RESPONSIVE.

It is the responsibility of each Bidder to ensure that its submission is received by 3:00 p.m. on the bid due date. The time/date stamp clock located in the Department of Purchasing & Contracting shall serve as the official authority to determine lateness of any bid. The bid opening time shall be strictly observed. Be aware that visitors to our offices will go through a security screening process upon entering the building. Bidders should plan enough time to ensure that they will be able to deliver their submission prior to our deadline. Late submissions, for whatever reason, will not be evaluated. Bidders should plan their deliveries accordingly. Telephone or fax bids will not be accepted.

PRICE SCHEDULE OPENING

Price Schedule openings shall be conducted in the Department of Purchasing and Contracting three (3) to five (5) days after the bid opening. Only the Price Schedules of responsive bidders shall be opened. The County reserves the right to decide which bid(s) will be deemed responsive and said determination shall be made in accordance with the requirements stated in this solicitation.

BUSINESS LICENSE

Bidders shall submit a copy of its current, valid business license with its Bid or upon award. If the Bidder is a Georgia corporation, Bidder shall submit a valid county or city business license. If Bidder is a joint venture, Bidder shall submit valid business licenses for each member of the joint venture. If the Bidder is not a Georgia corporation, Bidder shall submit a certificate of authority to transact business in the state of Georgia and a copy of its current, valid business license issued by its home jurisdiction. If Bidder holds a professional license, then Bidder shall submit a copy of the valid professional license. Failure to provide the business license, certificate of authority, or professional license required by this section, may result in the proposed Bid being deemed non-responsive.

GENERAL CONTRACTOR'S LICENSE NUMBER

As required by O.C.G.A. § 43-41-6, *et seq.*, a Bidder responding to this Invitation to Bid must provide a copy of its Georgia General Contractor's License with its Bid. The Georgia General Contractor's License must be issued in the name of the Bidder or in the name of its qualifying agent. If a proposed Bidder is relying upon a qualifying agent's Georgia General Contractor's License, then the name of the proposed Bidder must be set forth on the license as an affiliated business organization/dependent licensee. All licenses must be current, valid, and issued in compliance with applicable law. Failure to provide this license with the Bid will result in the proposed Bid being deemed non-responsive.

QUESTIONS, ADDENDA AND INTERPRETATION

All questions concerning the Project and requests for interpretation of the solicitation may be asked and answered at the pre-bid conference; however, oral answers are not authoritative. Questions must be submitted to the Department of Purchasing and Contracting in writing via email to jjschofield@dekalbcountyga.gov. Questions and requests for information or clarification concerning the specifications in this ITB must be submitted to the above listed contact person via email no later than the date and time listed in the bid timetable. Questions and requests for interpretation received after the above stated time or sent to anyone other than the listed contact person will not receive a response or be the subject of addenda. For questions and requests for interpretation after the pre-bid conference, each response shall be given in written addendum, separately numbered and dated, and published on the County website in sufficient time for interested parties to review. **No responses to requests, answers to specification questions, or additional information shall be supplied after "May 1, 2019"**

ACKNOWLEDGMENT OF ADDENDA

Addenda may be issued in response to changes in the Invitation to Bid. Addenda must be acknowledged by signing and returning the Addendum Acknowledgement with the Bid. Acknowledgments must be received by the County before the Bid opening time and date. Failure to properly acknowledge any addendum may result in the proposed Bid being deemed non-responsive. Bidder may call Jennifer Schofield at 404.687.4042 or send an

email to jjschofield@dekalbcountyga.gov to verify the number of addenda prior to submission. All addenda issued for this Project may be found on DeKalb County's website, http://www.dekalbcountyga.gov/purchasing/index.htm.

AUTHORITY TO SIGN

If a Bid is submitted by an individual, his/her name and mailing address must be shown. If submitted by a corporation, partnership, or joint venture, the name and physical mailing address of each member of the corporation, partnership, or joint venture must be shown. If submitted by a corporation, the Certificate of Corporate Bidder in the form attached to the Bid Document Package must be executed and submitted with the Bid. If submitted by a joint venture, the Certificate of Authority – Joint Venture in the form attached to the Bid Document Package must be executed and submitted with the Bid. A post office box is not acceptable as a physical mailing address. The legal and proper name of the proprietorship, corporation, or partnership submitting the Bid shall be printed or typed in the space provided on the Certificate of Corporate Bidder.

BID GUARANTEE TO ACCOMPANY BID

Each Bid must be accompanied by a Bid Guarantee in an amount of not less than ten percent (10%) of the amount of the Bid. The Bid Guarantee may be in the form of an official bank check payable to DeKalb County, or a Bid Bond in the form provided in the Bid Document Package. The Bid Bond shall be issued by a surety company licensed to write bonds in the State of Georgia, listed in the most current U.S. Treasury Circular No. 570, and have a current A.M. Best rating of "A" (Excellent) with a Financial Size Category of XII or better.

VALID INSURANCE, BONDS, LICENSES, PERMITS, AND CERTIFICATES

Bidder shall ensure that any bond, bid bond, payment bond, performance bond, insurance, license, permit or certificate submitted in response to this Invitation to Bid or as part of the Contract for this Project shall be current and valid when submitted, and shall remain valid, current and maintained in good standing for the Contract Term.

BUILDERS' RISK INSURANCE COVERAGE

DeKalb County shall procure and maintain Builders Risk Insurance on the entire work which provides "All-risk" form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism, malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by Supplementary Conditions) until Final Completion and Acceptance of the Project. Such policy of insurance shall contain at least the following sub-limits of insurance and deductibles:

Sub-limits:	
Property in Transit	$1,000,000
Property in Offsite Storage	$1,000,000
Plans & Blueprints	$25,000
Debris Removal	25% of Insured Physical Loss
Delay in Completion / Soft Cost	TBD
Ordinance of Law (Increased Cost of Construction)	$1,000,000
Flood and Earthquake	TBD – Full Contract Value
Deductibles:	
Flood and Earthquake	$25,000
Water Damage other than Flood	$100,000
All other Perils	$10,000

RIGHTS RESERVED

The County reserves the right to reject any or all Bids, to waive informalities, and to re-advertise. The County reserves the right to decide which Bid will be deemed lowest, responsive and responsible. For consideration as a responsible Bidder, the proposed Bidder shall, among other qualifications, demonstrate in its Bid that it has been the general contractor engaged in construction and successful completion of facilities of similar character and magnitude for at least **five (5)** years , and shall demonstrate the financial ability to perform the required Work. Bidder may be required to submit evidence setting forth qualifications which entitle him to consideration as a responsible Bidder. A list of work of similar character successfully completed within the last three (3) years may be

required as set forth in the Invitation to Bid giving the location and size of each project. Bidder shall complete the Reference and Release Form attached to the Bidder Document Package. In addition, the Bidder shall submit upon request by the County, a list of equipment available for use on this Work with its Bid. Any additions, conditions, limitations, or provisions attached to the Bid shall render it informal, and will be cause for rejection as non-responsive. No Bid may be revoked or withdrawn until sixty (60) days after the time set for opening the Bids.

AWARD OF CONTRACT

The Contract, if awarded, will be awarded to that responsible Bidder whose responsive Bid will be most advantageous to the County, price and other factors considered. The County is entitled to make the determination in its sole discretion. The Contract between the County and the Contractor shall be executed in the form attached to the Bid Document Package on pages , and shall form a binding contract between the contracting parties. A Performance Bond and a Payment Bond, each equal to 100% of the Contract Price, must be provided by the successful Bidder, issued in proper form by a surety company licensed to write bonds in the State of Georgia, listed in the most current U.S. Treasury Circular No. 570, and which has a current A.M. Best rating of "A" (Excellent) with a Financial Size Category of XII or better. Bonds given shall meet the requirements of the law of the State of Georgia including, but not limited to, O.C.G.A. §13-10-1 and §36-91-21 *et seq.*

FAILURE TO EXECUTE CONTRACT

The County shall have sixty (60) days after the time set for openings of Bids to notify a Bidder of the County's acceptance of the Bid and its intent to award the Contract to such Bidder. If the County so notifies a Bidder and the Bidder fails to enter into the Contract in the form attached to the Bid Document Package on pages within ten (10) days of receiving such notice, or fails within that time to provide the required Payment and Performance Bonds and proof of required insurance, the amount of the Bid Bond or other Bid Guarantee shall be paid over to the County as liquidated damages. The acceptance of the payment of the Bid Bond shall not operate to bar any claim the County might otherwise have against

the Bidder, and the County shall be authorized to pursue any claim against the Bidder for failure to consummate the Contract as may be authorized by law.

TIME AND LIQUIDATED DAMAGES

Construction must begin within ten (10) days from the date the Contractor acknowledges receipt of the Notice to Proceed, by signing and inserting the acknowledgement date on the Notice to Proceed. Contractor shall fully complete the Work within 305 days from and including the acknowledgement date. For failure to complete the Work within this period, the Contractor shall pay the County liquidated damages in the amount of **THREE HUNDRED FIFTY DOLLARS AND ZERO/CENTS Dollars ($350.00**) for each day in excess of the Contract Time unless an extension of the Contract Time has been obtained by Change Order, as defined in the Contract, prior to the expiration of the Contract Term as defined in the Contract.

DAVIS BACON WAGES ACT

Davis Bacon wage rates apply to this project. The applicable wage rate determination posted on the Davis Bacon web site of the U.S. Department of Labor, http://www.wdol.gov/dba.aspx applies to this project

LOCATIONS AND SITE

The site of the proposed Work is at the stated location(s) within DeKalb County, Georgia. By submitting a Bid, the Bidder accepts the site in its present condition and agrees, if awarded the Contract, to carry out all Work in accordance with the requirements of the Contract, the Specifications and as shown on the Drawings. The Bidder shall, before submitting a Bid, visit the site and acquaint itself with the actual conditions and the location of any or all obstructions that may exist on the site. The documents comprising the Contract contain the provisions required for the completion of the Work to be performed pursuant to this Contract. Information obtained from an officer, agent, or employee of the County, or any other person shall not affect the risks or obligations assumed by the Contractor or relieve it from fulfilling any of the conditions of the Contract. Each Bidder, prior to submitting his Bid, is responsible for inspecting the site and for reading and being

thoroughly familiar with all of the documents comprising the Contract and Bid Document Package. The failure or omission of any Bidder to so familiarize himself shall in no way relieve any Bidder from any obligation in respect to his Bid. The Contractor shall inspect all easements and rights-of-way to insure that the County has obtained all land and rights-of-way necessary for completion of the Work to be performed pursuant to the Contract. The Contractor shall comply with all stipulations contained in easements acquired by the County. If applicable to the Work, all easements and rights-of-way documents are available for inspection in the office of , , . The Contractor shall not be entitled to damages and agrees not to make any claim against the County, its officials or employees for the failure to obtain necessary interests in land for this Project. The Contractor shall accurately locate above-ground and below-ground utilities and structures which may be affected by the Work using whatever means may be appropriate.

DEKALB FIRST ORDINANCE

It is the objective of the Chief Executive Officer and Board of Commissioners of DeKalb County to provide maximum practicable opportunity for all businesses to participate in the performance of government contracts. The current DeKalb County List of Certified Vendors may be found on the County website at http://www.dekalbcountyga.gov/purchasing/pdf/supplierList.pdf

It is required that all responding Bidders attend the mandatory LSBE meeting within two-weeks of the solicitation's advertisement, and comply, complete and submit all LSBE forms with the Bidder's response in order to remain responsive. Attendance can be in person, via video conference and teleconference. Video conferencing is available through Skype/Lync. Instructions for attendance via video conference can be found on the County's website at https://www.dekalbcountyga.gov/purchasing-contracting/dekalb-first-lsbe-program.

For further details regarding the DeKalb First Local Small Business Enterprise Ordinance, contact the LSBE Program representative at pcadmin-ops@dekalbcountyga.gov or (404) 371-7051.

FEDERAL WORK AUTHORIZATION PROGRAM PARTICIPATION

All qualifying Contractors and Subcontractors performing work with DeKalb County, Georgia must register and participate in the federal work authorization program to verify the work eligibility information of new employees. In order for a Bid to be considered, it is mandatory that the Bidder's Affidavit of Compliance with O.C.G.A. §13-10-91 included as page be completed and submitted with the Bid.

GEORGIA OPEN RECORDS ACT

Without regard to any designation made by the person or entity making a submission, DeKalb County considers all information submitted in response to this invitation or request to be a public record that will be disclosed upon request pursuant to the Georgia Open Records Act, O.C.G.A. §50-18-70 et seq., without consulting or contacting the person or entity making the submission, unless a court order is presented with the submission. You may wish to consult an attorney or obtain legal advice prior to making a submission.

FIRST SOURCE JOBS ORDINANCE

The DeKalb County First Source Jobs Ordinance requires contractors or beneficiaries entering into any type of agreement with the County, including purchase orders, regardless of what they may be called, for the procurement or disposal of supplies, services, construction projects, professional or consultant services, which is funded in whole or part with County funds or County administered funds in which the contractor is to receive $50,000 or more in County expenditures or committed expenditures and recipient of urban redevelopment action grants or community development block funds administered in the amount of $50,000 or more make a good faith effort to hire DeKalb County residents for at least 50% of jobs using the First Source Registry (candidate database). The work to be performed under this contract is subject to the provisions of the DeKalb County First Source Jobs Ordinance. Please complete the First Source Jobs Ordinance Acknowledgement Form included in Attachment , First Source Jobs Ordinance (with Exhibits 1 – 4) and submit with the responder's proposal.

For more information on the First Source Jobs Ordinance requirement, please contact WorkSource DeKalb at www.worksourcedekalb.org or 404-687-3400.

ETHICS RULES

Bidders are subject to the Ethics provision within the DeKalb County Purchasing Policy; the Organizational Act, Section 22A, the Code of DeKalb County; and the rules of Executive Order 2014-4. Any violations will be addressed, pursuant to these policies and rules.

To the extent that the Organizational Act, Section 22A, the Code of DeKalb County, and the rules of Executive Order 2014-4 allow a gift, meal, travel expense, ticket, or anything else of value to be purchased for a CEO employee by a contractor doing business with the County, the contractor must provide written disclosure, quarterly, of the exact nature and value of the purchase to the Chief Integrity Officer, if created, or the Finance Director or his/her designee. Every contractor conducting business with the County will receive a copy of these ethical rules at the time of execution of the contract.

DEKALB COUNTY, GEORGIA'S TITLE VI POLICY STATEMENT

DeKalb County, Georgia is committed to compliance with Title VI of the Civil Rights Act of 1964 and all related regulations and directives. DeKalb County assures that no person shall on the grounds of race, color, sex, or national origin, as provided by Title VI of the Civil Rights Act of 1964, the Federal-Aid Highway Transportation Act of 1973, and the Civil Rights Restoration Act of 1987 be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity. DeKalb County further assures that no person shall on the grounds of age, low income, disability, sexual orientation or gender identity be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity.

DeKalb County assures every effort will be made to ensure nondiscrimination in all of its programs and activities, whether those programs and activities are federally funded or not. In addition, DeKalb County will take reasonable steps to provide meaningful access to services for persons with Limited English Proficiency (LEP).

STANDARD COUNTY CONTRACT

The attached sample contract is the County's standard contract document, which specifically outlines the contractual responsibilities. All bidders should thoroughly review the document prior to submitting a bid. Any proposed revisions to the terms or language of this document must be submitted in writing with the bidder's bid. Since proposed revisions may result in a bid being rejected if the revisions are unacceptable to the County, bidders should review any proposed revisions with an officer of the firm having authority to execute the contract. No alterations can be made in the contract after award by the Board of Commissioners.

Invitation No. 19-101084

BIDDER'S LUMP SUM PRICE
(consisting of 1 page)

***** BID PRICE FORM MUST BE SUBMITTED IN A SEPARATE SEALED ENVELOPE OR BIDDER WILL BE DEEMED NON-RESPONSIVE AND WILL NOT BE CONSIDERED FOR AWARD*****

TO: The Governing Authority of DeKalb County, Georgia

The undersigned, as Bidder, declares that he has carefully examined the Bid Document Package for ITB No. 19-101084, Lou Walker Senior Center Classroom Renovation), an annexed proposed form of Contract, the Specifications therein contained, and the Drawings therein referred to, and that he proposes and agrees that if his Bid is accepted, to provide the necessary machinery, tools, apparatus, and other means of construction, and will furnish all materials and labor specified in the Contract, or called for by the Drawings, or necessary to complete the Work in the manner therein specified within the time specified, as therein set forth for the following lump sum amount which sum is hereinafter referred to as the "Base Bid." The Base Bid includes and encompasses the cost of all labor, materials, equipment, tools, supervision, scheduling, safety program, coordination, engineering, testing, surveys, layout, cleanup, and other things and services required to complete the entire Project in strict conformity with the Drawings, Specifications, the Contract, and all addenda and authorized written clarifications issued prior to the Bid date. Without limitation, the Base Bid also includes all applicable sales and use taxes, fees, temporary lighting, heating and cooling, temporary utilities, security for the site, freight costs, handling costs, permit costs, field and main office costs, bond premiums, insurance premiums, direct and indirect administrative costs, overhead, and profit.

_____ ($_____)

(State amount in words on this line) (In figures)

Attached hereto is Bid Bond made by _____
_____, a surety company listed in the most current Us Treasury Circular No. 570 and licensed to write surety bonds in the State of Georgia, payable to DeKalb County, Georgia (or official bank check), in the amount of ten percent (10%) of the above Bid, to-wit: $_____.

If this Bid shall be accepted by DeKalb County and the undersigned shall fail to execute a satisfactory contract in the form of said proposed Contract, give satisfactory Performance and Payment Bonds, or furnish satisfactory proof of the insurance required, as stated in the Instructions to Bidders attached hereto within ten (10) days from the Notice of Award of the Contract, then the County may at its option, determine that the undersigned abandoned the Contract and thereupon this Bid shall be null and void, and the sum stipulated in the attached Bid Bond (or official bank check) shall be forfeited to the County as liquidated damages.

Bidder declares its intent to subcontract the portion of the Work as below stated. Bidder understands and agrees that the use of any Subcontractor not listed below shall be strictly prohibited without prior written approval from the County. (*List the names of all subcontractors and the work to be performed by the subcontractor on the lines provided below.)*

_____

_____

Bidder further declares that the full names and residence addresses of all persons and parties interested in the foregoing Bid as principals are as follows:

_____

_____

Bidder declares further that it is ☐ / is not ☐ a DeKalb County Firm.

Signed, sealed, and dated this _____ day of _____, 20____.

By:_____(SEAL)
Signature

_____
Print Name of Signer

_____
Title of Signer

_____
Name of Business Entity Submitting Bid

_____
Bidder's Street Address

_____
Bidder's City, State and Zip Code

_____
Bidder's Phone Number

_____
Bidder's Fax Number

_____
Bidder's E-Mail Address

Bidder declares his intent to subcontract the portion of the Work as below stated. Bidder understands and agrees that the use of any Subcontractor not listed below shall be strictly prohibited without prior written approval from the County**.** (*List names of all subcontractors and the work to be provided by the subcontractor on the lines provided below.)*

_____

_____

_____

Bidder further declares that the full names and residence addresses of all persons and parties interested in the foregoing Bid as principals are as follows:

_____

_____

_____.

Bidder declares further that it is ☐ / is not ☐ a DeKalb County Firm.

Signed, sealed, and dated this _____ day of _____, 20___.

By:_____(SEAL)
Signature

_____
Print Name of Signer

_____
Title of Signer

_____
Name of Business Entity Submitting Bid

_____
Bidder's Street Address

_____
Bidder's City, State and Zip Code

_____
Bidder's Phone Number

_____
Bidder's Fax Number

_____
Bidder's E-Mail Address

BID BOND FORM

KNOW ALL MEN BY THESE PRESENTS, that we, _____

_____

(hereinafter called the Principal) and _____

_____ (hereinafter called the Surety), a corporation chartered and existing under the laws of the State of with its principal offices in the City of _____ _____and listed in the Federal Register and licensed to write surety bonds in the State of Georgia, are held and firmly bound unto DeKalb County, Georgia, in the full and just sum of 10% of the Principal's Bid good and lawful money of the United States of America, to be paid upon demand of DeKalb County, Georgia, to which payment well and truly to be made we bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally and firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted to DeKalb County, Georgia, a Bid for (*insert name of the Project*)_____

_____.

WHEREAS, the Principal desires to file this Bond in accordance with law to accompany this Bid.

NOW, THEREFORE, the conditions of this obligation are such that if the Bid be accepted within sixty (60) days of the Bid opening, the Principal shall execute a Contract in accordance with the Bid and upon the terms, conditions, and prices set forth therein, and in the form and manner required by DeKalb County, Georgia, and within ten (10) days from the date of Notice of Award of the Contract, execute a sufficient and satisfactory Performance Bond and Payment Bond payable to DeKalb County, Georgia, each in an amount of one hundred percent (100%) of the total Contract Price, in form and with security satisfactory to DeKalb County and furnish satisfactory proof of the insurance required, then this obligation to be void; otherwise, to be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid

DeKalb County, Georgia, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20____.

PRINCIPAL

By: _____(SEAL)
Signature of Principal

_____
Print Name and Title of Authorized Signer

_____
Print Name of Principal Business

ATTEST:

_____
Corporate Secretary

SURETY

By: _____(SEAL)
Signature of Surety (by Power of Attorney)

_____
Print Name and Title of Authorized Signer

_____
Print Name of Surety Business

WITNESS:

_____

DeKalb WORK SOURCE GEORGIA | DeKalb County

ATTACHMENT H
FIRST SOURCE JOBS ORDINANCE INFORMATION
(WITH EXHIBITS 1 – 4)

EXHIBIT 1

First Source Jobs Ordinance Acknowledgement

The DeKalb County First Source Ordinance requires contractors or beneficiaries of eligible projects entering into any type of agreement with the County, including purchase orders, regardless of what they may be called, for the procurement or disposal of supplies, services, construction projects, professional or consultant services, which is funded in whole or part with County funds or County administered funds in which the contractor is to receive $50,000 or more in County expenditures or committed expenditures and recipient of urban redevelopment action grants or community development block funds administered in the amount of $50,000 or more to make a good faith effort to hire DeKalb County residents for at least 50% of jobs created using the First Source Registry (candidate database) within one hundred twenty (120) days of contract execution. The work to be performed under this contract is subject to the provisions of the DeKalb County First Source Jobs Ordinance. All contractors will be asked to submit an ***Employment Roster*** and/or copies of active payroll registers on a monthly basis to verify compliance. The undersigned acknowledges and agrees to comply with the provisions of the DeKalb County First Source Jobs Ordinance.

CONTRACTOR OR BENEFICIARY INFORMATION:

_____
Contractor or Beneficiary Name (Signature)

_____
Contractor or Beneficiary Name (Printed)

_____
Title

_____
Telephone

_____
Email

_____
Name of Business

Please answer the following questions:

1. How many job openings do you anticipate filling related to this contract? _____

2. How many incumbents/existing employees will retain jobs due to this contract?
   DeKalb Residents: _____ Non-DeKalb Residents: _____

3. How many work hours per week constitutes Full Time employment? _____

Please return this form to WorkSource DeKalb, (404)687-3900 or email to fkadkins@dekalbcountyga.gov, malee@dekalbcountyga.gov, vlnicksion@dekalbcountyga.gov, or jmjones@dekalbcountyga.gov

WorkSource DeKalb (WSD) is an EEO/M/F/D/V employer/program. Auxiliary aids/services are available upon request to individuals with disabilities. Persons with hearing impairments may call 1-800-255-0135 or 711 for assistance. WSD is 100% funded by the U. S. Department of Labor and is a proud partner of the American Job Center Network. Revised March 2018

FIRST SOURCE JOBS ORDINANCE INFORMATION
EXHIBIT 2

NEW EMPLOYEE TRACKING FORM

Name of Bidder_____
Address_____
E-Mail_____
Phone Number_____
Fax Number_____
Do you anticipate hiring from the First Source Candidate Registry? Y or N (Circle one)
If so, the approximate number of employees you anticipate hiring: _____

Type of Position (s) you anticipate hiring: **(List position title, one position per line)** **Attach job description per job title:**	**The number you anticipate hiring:**	**Timeline**

Please return this form to WorkSource DeKalb, fax (404) 687-4099 or email to FirstSourceJobs@dekalbcountyga.gov.

FIRST SOURCE JOBS ORDINANCE INFORMATION
EXHIBIT 3

BUSINESS SERVICE REQUEST FORM

ote: We need one form completed for each position that you have available.

FEDERAL TAX ID:

COMPANY NAME: **WEBSITE:**

ADDRESS:

(WORKSITE ADDRESS IF DIFFERENT):

CONTACT NAME:

CONTACT PHONE: **CONTACT FAX:**

CONTACT E-MAIL ADDRESS:

Are you a private employment agency or staffing agency? ☐**YES** ☐**NO**

JOB DESCRIPTION: (PLEASE INCLUDE A COPY OF JOB DESCRIPTION)

POSITION TITLE:

NUMBER OF POSITIONS AVAILABLE:_____ TARGET START DATE:_____

WEEKLY WORK HOURS: 20-30 hours ☐ **30-40 hours** ☐ **Other** ☐

SPECIFIC WORK SCHEDULE:

SALARY RATE(OR RANGE):

PERM ☐ **TEMP** ☐ **TEMP-TO-PERM** ☐ **SEASONAL** ☐

PUBLIC TRANSPORTATION ACCESSIBILITY YES ☐ **NO** ☐

IF SCREENINGS ARE REQUIRED, SELECT ALL THAT APPLY:
☐**CREDIT** ☐**DRUG** ☐**MVR** ☐**BACKGROUND** ☐**OTHER** _____

Please return form to: Business Solutions Unit (First Source)
774 Jordan Lane Bldg. #4
Decatur, Ga. 30033
Phone: (404) 687-3400
FirstSourceJobs@dekalbcountyga.gov

CONTRACTOR REFERENCE AND RELEASE FORM

List below at least three (3) references, including company name, contact name, address, email address, telephone numbers and contract period who can verify your experience and ability to perform the type(s) of product(s)/ service(s) listed in the solicitation within the last three (3) years.

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

REFERENCE CHECK RELEASE STATEMENT

You are authorized to contact the references provided above for purposes of this ITB.

Signed_____ Title_____
(Authorized Signature of Bidder)

Company Name _____Date _____

SUBCONTRACTOR REFERENCE AND RELEASE FORM

List below at least three (3) references, including company name, contact name, address, email address, telephone numbers and contract period who can verify your experience and ability to perform the type(s) of product(s)/ service(s) listed in the solicitation. within the last three (3) years.

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

Company Name	Contract Period		
Contact Person Name and Title	Telephone Number (include area code)		
Complete Primary Address	City	State	Zip Code
Email Address	Fax Number (include area code)		
Project Name and Description			

REFERENCE CHECK RELEASE STATEMENT

You are authorized to contact the references provided above for purposes of this ITB.

Signed_____ Title_____
(Authorized Signature of Bidder)

Company Name _____Date _____

DEKALB FIRST LSBE INFORMATION
WITH EXHIBITS A – B

SCHEDULE OF LOCAL SMALL BUSINESS ENTERPRISE PARTICIPATION OPPORTUNITY TRACKING FORM

The Chief Executive Officer and the Board of Commissioners of DeKalb County believe that it is important to encourage the participation of small and local businesses in the continuing business of County government; and that the participation of these types of businesses in procurement will strengthen the overall economic fabric of DeKalb County, contribute to the County's economy and tax base, and provide employment to local residents. Therefore, the Chief Executive Officer and the Board of Commissioners have made the success of local small businesses a permanent goal of DeKalb County by implementing the DeKalb First Local Small Business Enterprise Ordinance.

PROVISIONS OF DEKALB FIRST LOCAL SMALL BUSINESS ENTERPRISE (LSBE) ORDINANCE

Percentage of LSBE Participation Required
20% of Total Award

Certification Designation	Request For Proposals (RFP)
LSBE Within DeKalb (LSBE-DeKalb)	Ten (10) Preference Points
LSBE Outside DeKalb (LSBE-MSA)	Five (5) Preference Points
Demonstrated GFE	Two (2) Preference Points

Certified Local Small Business Enterprises (LSBEs) located within DeKalb County and prime contractors utilizing LSBEs that are locally-based inside DeKalb County shall receive ten (10) points in the initial evaluation of their response to any Request for Proposal. Certified LSBEs located outside of DeKalb County but within the nine (9) County Metropolitan Statistical Area (MSA) consisting of Cherokee, Clayton, Cobb, Douglas, Fayette, Fulton, Gwinnett, Henry and Rockdale Counties shall receive five (5) points in the initial evaluation of their response to any Request for Proposal. Prime Contractors who demonstrate sufficient good faith efforts in accordance with the requirements of the ordinance shall be granted two (2) points in their initial evaluation of responses to any Request for Proposal. Pro-rated points shall be granted where a mixture of LSBE-DeKalb and LSBE MSA firms are utilized. Utilization of each firm shall be based upon the terms of the qualified sealed solicitation.

Prime Contractor(s) deemed responsible and remains responsive to an Invitation to Bid (ITB) because they are either a certified LSBE-DeKalb or LSBE-MSA firm or has obtained 20% participation of an LSBE-DeKalb or LSBE-MSA firm, submits the lowest bid price shall be deemed the lowest, responsive and responsible bidder.

Prime Contractor(s) deemed responsible and remains responsive to an Invitation to Bid (ITB) and documented good faith efforts, submits a lower bid price than a Prime Contractor that achieved 20% LSBE participation, or otherwise required benchmark, then the Prime Contractor who actually met the benchmark will be given the opportunity to match the lowest bid price of the Prime Contractor who

only made good faith efforts. Prime Contractor(s) who choose **not** to match the lowest bid price, then the Prime Contractor who made the good faith efforts will be deemed the lowest, responsive and responsible bidder.

For all qualified sealed solicitations, the Director of Purchasing and Contracting, DeKalb County Government, shall determine if the bidder/proposer has included written documentation showing that at least twenty percent (20%) of the total contract award will be performed by a certified LSBE. This written documentation shall be in the form of a notarized Schedule of LSBE Participation (Attached hereto as "Exhibit A".) For all contracts, a signed letter of intent from all certified LSBEs describing the work, material, equipment and/or services to be performed or provided by the LSBE(s) and the agreed upon percentage shall be due with the bid or proposal documents and included with "Exhibit A". The certified vendor list establishes the group of Certified LSBE's from which the bidder/proposer must solicit subcontractors for LSBE participation. This list can be found on our website http://www.dekalbcountyga.gov/purchasing-contracting/about-purchasing-and-contracting or obtained from the Special Projects LSBE Program team.

Prime Contractors failing to meet the LSBE benchmark must document and demonstrate Good Faith Efforts in accordance with the attached "Checklist for Good Faith Efforts" portion of "Exhibit A." The notarized Schedule of LSBE Participation shall be due and submitted with each bid or proposal. Failure to achieve the LSBE benchmark or demonstrate good faith efforts shall result in a bid or proposal being rejected. Prime Contractors that fail to attend the mandatory LSBE meeting in person or via video conference shall mean that the Prime Contractor has not demonstrated sufficient good faith efforts and its bid or proposal if submitted, shall be deemed non-responsive without any further review.

Upon award, Prime Contractors are required to submit a report detailing LSBE Sub-Contractor usage with each request for payment and not less than on a monthly basis. Prime Contractors shall ensure that all LSBE sub-contractors have been paid within seven (7) days of the Prime's receipt of payment from the County. Failure to provide requested reports/documentation shall constitute a material breach of contract, entitling the County to terminate the Contract for default or pursue other remedies. LSBE sub-contractors must confirm payments received from the Prime(s) for each County contract they participate in.

For eligible bids/proposals valued over $5,000,000.00, the Mentor-Protégé provision of the Ordinance shall apply. Prime Contractors must agree to become mentors and take on an LSBE protégé in an effort to enhance the potential of future LSBEs. Qualifying projects shall be performed by both Mentor and Protégé through a subcontract between both parties. This requirement is in addition to all other applicable sections of the DeKalb First Ordinance. Please review the ordinance, section 2-214 or contact the LSBE Program Representative for detailed information regarding this initiative.

EXHIBIT A

SCHEDULE OF DEKALB FIRST LOCAL SMALL BUSINESS ENTERPRISE PARTICIPATION

OPPORTUNITY TRACKING FORM

As specified, Bidders and Proposers are to present the details of LSBE participation below:

PRIME
BIDDER/PROPOSER_____

SOLICITATION NUMBER: **19-101084**

TITLE OF UNIT OF WORK – **Lou Walker Senior Center Classroom Renovation**

1. My firm, as the prime bidder/proposer on this unit of work, is a certified (check all that apply):
   ____LSBE-DeKalb ____LSBE-MSA

2. If you are a Certified LSBE-DeKalb or MSA, please indicate below the percentage of that your firm will carry out directly: _____.

3. If the prime bidder/proposer is a joint venture, please describe below the nature of the joint venture and level of work and percentage of participation to be provided by the LSBE-DeKalb or MSA joint venture firm.
   _____

   _____

4. List the LSBE-DeKalb or MSA subcontractors and/or firms (including suppliers) to be utilized in of this contract, if awarded. No changes can be made in the subcontractors listed below without the prior written approval of the County. Please attach a signed letter of intent from all certified LSBEs describing the work, materials, equipment or services to be performed and/or provided and the agreed upon percentage of work to be performed. A Letter of Intent form is attached hereto as "Exhibit B".

Name of Company	
Address	
Telephone	
Fax	
Contact Person	
Indicate certification status and attach proof of certification: LSBE-DeKalb/LSBE-MSA	
Description of services to be performed	
Percentage of work to be performed	

Name of Company	
Address	
Telephone	
Fax	
Contact Person	
Indicate certification status and attach proof of certification: LSBE-DeKalb/LSBE-MSA	
Description of services to be performed	
Percentage of work to be performed	

Name of Company	
Address	
Telephone	
Fax	
Contact Person	
Indicate certification status and attach proof of certification: LSBE-DeKalb/LSBE-MSA	
Description of services to be performed	
Percentage of work to be performed	

Name of Company	
Address	
Telephone	
Fax	
Contact Person	
Indicate certification status and attach proof of certification: LSBE-DeKalb/LSBE-MSA	
Description of services to be performed	
Percentage of work to be performed	

Please attach additional pages, if necessary.

EXHIBIT A, CONT'D

DEKALB COUNTY
CHECKLIST FOR GOOD FAITH EFFORTS

A bidder/proposer that does not meet the County's LSBE participation benchmark is required to submit documentation to support all "Yes" responses as proof of "good faith efforts." Please indicate whether or not any of these actions were taken:

	Yes	No	Description of Actions
1.			Prime Contractors shall attend a **MANDATORY LSBE** Meeting in person or via video conference within two-weeks of advertisement of the solicitation.
2.			Provide a contact log showing the company's name, contact person, address, email and contact number (phone or fax) used to contact the proposed certified subcontractors, nature of work requested for quote, date of contact, the name and title of the person making the effort, response date and the percentage of work.
3.			Provide interested LSBEs via email, of any new relevant information, if any, at least 5 business days prior to submission of the bid or proposal.
4.			Efforts made to divide the work for LSBE subcontracting areas likely to be successful and to identify portions of work available to LSBEs consistent with their availability. Include a list of divisions of work not subcontracted and the corresponding reasons for not including them. The ability or desire of a bidder/proposer to perform the contract work with its own organization does not relieve it of the responsibility to make good faith efforts on all scopes of work subject to subcontracting.
5.			Efforts were made to assist potential LSBE subcontractors meet bonding, insurance, or other governmental contracting requirements. Where feasible, facilitating the leasing of supplies or equipment when they are of such a specialized nature that the LSBE could not readily and economically obtain them in the marketplace.
6.			Communication via email or phone with DeKalb First Program Staff seeking assistance in identifying available LSBEs. Provide DeKalb First Program Staff representative name and title, and date of contact.
7.			For all contracts, a signed letter of intent from all certified LSBEs describing the work, materials, equipment or services to be performed or provided by the LSBE(s) and the agreed upon LSBE participation percentage shall be due with the bid or proposal documents.
8.			Other Actions, to include Mentor/Protégé commitment for solicitations $5M and above (specify):

Please explain all "no" answers above (by number):

_____

_____

_____

This list is a guideline and by no means exhaustive. The County will review these efforts, along with attached supporting documents, to assess the bidder/proposer's efforts to meet the County's LSBE Participation benchmark. If you require assistance in identifying certified, bona fide LSBEs, please contact the Purchasing and Contracting Department - DeKalb First Program, Felton Williams, Procurement Projects Manager at 404-371-6312.

EXHIBIT A, CONT'D

DEKALB FIRST LOCAL SMALL BUSINESS ENTERPRISE SCHEDULE OF PARTICIPATION
OPPORTUNITY TRACKING FORM

Bidder/Proposer Statement of Compliance

Bidder(s)/Proposer(s) hereby state that they have read and understand the requirements and conditions as set forth in the objectives and that reasonable effort were made to support the County in providing the maximum practicable opportunity for the utilization of LSBEs consistent with the efficient and economical performance of this contract. The Bidder and any subcontractors shall file compliance reports at reasonable times and intervals with the County in the form and to the extent prescribed by the Director of DeKalb County Purchasing and Purchasing and Contracting Department. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs and statistics of Contractors and their subcontractors.

1. **Non-Discrimination Policy**
   a. During the performance of this agreement, Contractor agrees to conform to the following Non-Discrimination Policy adopted by the County.
   b. Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or disability. The Contractor will take action to ensure that applicants are employed, and the employees are treated during employment without regard to their race, color, religion, sex, national origin, or disability. Such action shall include, but not be limited to, the following:
      (1) Employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places available to employees and applicants for employment, notices to be provided setting forth provisions of this non-discrimination clause.
      (2) Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, or disability.
   c. Without limiting the foregoing, Contractor shall not discriminate on the basis of disability in the admission or access to, or treatment or employment in, the programs and activities, which form the subject of the contract. The Contractor will take action to ensure that applicants for participation in such programs and activities are considered without regard to disability. Such action shall include, but not be limited to, the following:
      (1) Contractor agrees to post in conspicuous places available to participants in its programs and activities notices to be provided setting forth the provisions of this non-discrimination clause.

(2) Contractor shall, in all solicitations or advertisements for programs or activities, which are the subject of the contract, state that all qualified applicants will receive consideration for participation without regard to disability.

2. **Commitment**

The undersigned certifies that he/she has read, understands, and agrees to be bound by the bid specifications, including the accompanying Exhibits and other terms and conditions of the Invitation to Bid and/or Request for Proposal regarding LSBE utilization. The undersigned further certifies that he/she is legally authorized by the bidder or responder to make the statements and representations in Exhibit A and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned will enter into formal agreement(s) with the LSBE(s) listed in this Exhibit A, which are deemed by the owner to be legitimate and responsible LSBEs. Said agreement(s) shall be for the work and contract with the Prime Contractor. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder knowing them to be false, or if there is a failure of the successful Bidder (i.e., Contractor) to implement any of the stated agreements, intentions, objectives, goals and commitments set forth herein without prior approval of the County, then in any such events the contractor's act or failure to act, as the case may be, shall constitute a material breach of contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and not in lieu of, any other rights and remedies the County may have for other defaults under the Contract. Additionally, the Contractor will be subject to the loss of any future contract awards by the County for a period of one year.

Firm Name (Please Print):

_____

Firm's Officer:

_____

(Authorized Signature and Title Required) Date

Sworn to and Subscribed to before me this ____ day of_____, 201__.

_____

Notary Public

My Commission Expires:_____

EXHIBIT B

LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR PROVIDING MATERIALS OR SERVICES

Instructions:

1. Complete the form in its entirety and submit with bid documents.
2. Attach a copy of the LSBE's current valid Certification Letter.

To:_____

(Name of Prime Contractor Firm)

From:_____ **☐ LSBE –DeKalb ☐ LSBE –MSA**
(Name of Subcontractor Firm) **(Check all that apply)**

ITB Number: 19-101084

Project Name: Lou Walker Senior Center Classroom Renovation

The undersigned subcontractor is prepared to perform the following described work or provide materials or services in connection with the above project (specify in detail particular work items, materials, or services to be performed or provided).

Description of Materials or Services	Project/Task Assignment	% of Contract Award

Prime Contractor **Sub-contractor**

Signature:_____ **Signature:**_____

Title:_____ **Title:**_____

Date:_____ **Date:** _____

CERTIFICATE OF CORPORATE BIDDER

I, _____(*insert name of the Corporate Secretary*), certify that I am Secretary of the corporation named as Bidder herein, same being organized and incorporated to do business under the laws of the State of _____; that _____ (*insert name of individual signing the Bid*) who executed this Bid on behalf of the Bidder was, then and there, _____ (*insert title of individuals signing the Bid*) and that said Bid was duly signed by said officer for and on behalf of said corporation, pursuant to the authority of its governing body and within the scope of its corporate powers.

I further certify that the names and addresses of the owners of all outstanding stock of said corporation as of this date are as follows:

_____

_____

_____

_____

_____

This _____ day of _____, 20___.

By:_____(Corporate Seal)
Secretary

CERTIFICATE OF AUTHORITY – JOINT VENTURE
(Separate Certificate to be submitted by each joint venture partner)

I, _____,[1] certify that:

1. I am the _____[2] of _____,[3] (hereinafter "Venturer");

2. Venturer is a partner and participant in the joint venture having submitted the Invitation to Bid or Request for Proposal No. _____ for _____(*insert Project Name*);

3. Venturer is organized and incorporated to do business under the laws of the State of _____; and

4. Said Invitation to Bid or Request for Proposal No._____ was duly signed by said officer for and on behalf of said Venturer and the Contractor pursuant to the authority of the governing body of each and within the scope of its corporate powers.

I further certify that the names and addresses of the owners of all the outstanding stock or ownership interest in Venturer as of this date are as follows:

_____
_____
_____

This _____ day of _____, 20___.

By:_____
Signature of Person Executing Certification

INSTRUCTIONS FOR COMPLETION OF THIS CERTIFICATE:

1. Name of secretary (if Venturer is a corporation), or Manager or CEO (if Venturer is a LLP) of Venturer.
2. Title of person executing Certification.
3. Name of joint venture partner.

COPY THIS FORM AND SUBMIT SEPARATE CERTIFICATES FOR EACH JOINT VENTURE PARTNER WITH THE BID OR PROPOSAL.

BIDDER'S AFFIDAVIT OF COMPLIANCE WITH O.C.G.A. §13-10-91

By executing this affidavit, the undersigned verifies its compliance with O.C.G.A. § 13-10-91, as amended, stating affirmatively that the Bidder submitting a Bid to DEKALB COUNTY, GA, a political subdivision of the State of Georgia, has registered with and is participating in a federal work authorization program, commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91, as amended. The undersigned further verifies that it will continue to use the federal work authorization program for the Contract Term, and it will only contract with Subcontractors who have registered for the federal work authorization program. The undersigned hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ___, 20__ in _____(city), _____(state).

By:_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

Subscribed and Sworn before me on this the
____ day of _____, 20__.

_____
NOTARY PUBLIC
My Commission Expires:
_____

SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned verifies its compliance with O.C.G.A. § 13-10-91, as amended, stating affirmatively that the individual, firm, or corporation which is engaged in the physical performance of services under a contract with _____name of contractor) on behalf of DEKALB COUNTY, GA, a political subdivision of the State of Georgia, has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603, in accordance with the applicability provisions and deadlines established in O.C.G.A. § 13-10-91, as amended]. The affiant agrees to continue to use the federal work authorization program throughout the contract period.]

_____

BY: Authorized Officer or Agent
(Bidder's Name)

_____

Federal Work Authorization
Enrollment Date

_____

Title of Authorized Officer or Agent of Bidder

_____

Identification Number

_____
Printed Name of Authorized Officer or Agent

_____
Address (* do not include a post office box)

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE

_____ DAY OF _____, 20__

_____
Notary Public
My Commission Expires: _____

STATE OF GEORGIA
COUNTY OF DEKALB

CONTRACTOR AFFIDAVIT AND
OATH OF SUCCESSFUL BIDDER

Personally appeared before me, the undersigned officer, duly authorized to administer oaths,_____,(*insert name*), who, after being duly sworn, deposes as follows:

I,_____, (*insert name*), am a competent adult, and I have personal knowledge of the facts set forth in this Affidavit and Oath which I make for any lawful use or purpose.

I,_____(*insert name*) swear or affirm that I have not prevented or attempted to prevent competition in bidding or submitting a proposal for this Project by any means whatsoever. I swear or affirm that I have not prevented or endeavored to prevent anyone from making a Bid for this Project by any means whatsoever, I swear I have not caused or induced any other person to withdraw a Bid for this Project. I swear or affirm that I have not violated O.C.G.A. §36-91-21(d) in any way, directly or indirectly.

I hereby declare under penalty of perjury that the foregoing is true and correct. Executed on

_____ ___, 20__ in _____(*city*), _____(*state*).

By:_____
Signature

_____
Print Name of Affiant

_____
Print Title of Affiant

Subscribed and Sworn before me on this the
_____ day of _____, 20_____.

_____
NOTARY PUBLIC
My Commission Expires:
_____

REQUIRED DOCUMENTS CHECKLIST

Bidder shall complete and submit the following documents with their bid:

Bid Page No.	Title	Check This Box If Included With Bid
3	Bid Acknowledgement Form*	
17-19	Bidder's Lump Sum Price Form* (separate sealed envelope)	
24	First Source Jobs Acknowledgement Form *	
25	New Employee Tracking Form*	
26	Business Service Request Form*	
27	Employment Roster	
28	Contractor Reference and Release Form*	
29	Subcontractor Reference and Release Form, if applicable**	
30-38	LSBE - Exhibits A and/or B of Attachment G*	
39	Certificate of Corporate Bidder*	
40	Certificate of Authority – Joint Venture* (if applicable)	
41	Bidder's Affidavit of Compliance	
42	Subcontractor Affidavit of Compliance if applicable**	
43	Contractor Affidavit and Oath of Successful Bidder*	
44	Required Documents Checklist	
7-8	General Contractor's License*	
7	Business License*	
22-23	Bid Bond*	

***If these mandatory forms are not completed and submitted with the bid, the bidder will be deemed non-responsive.**

****These forms are applicable if a subcontractor will be utilized to fulfill the requirements of this contract. If these forms are applicable, they must be completed and submitted with the bid. Failure to submit these forms, if applicable, will result in the bidder's bid being deemed non-responsive.**

I, the undersigned, acknowledge that I have included the requested documents as listed above.

_____ _____

Firm Name Name and Signature of Authorized Rep.

STATE OF GEORGIA

COUNTY OF DEKALB

CONTRACT FOR CONSTRUCTION

THIS CONTRACT, made as of this ____day of _____, 20___, (hereinafter called the "execution date") by and between, **DEKALB COUNTY,** a political subdivision of the State of Georgia (hereinafter called the "County") and _____, a _____ organized pursuant to the laws of the State of _____(hereinafter called the "Contractor").

I. SCOPE OF WORK

A. The term "Work" means the construction, labor, materials, equipment, tools, machinery, testing, temporary services and utilities, supervision, administration, coordination, planning, insurance, bonds, transportation, security, and all other services and things necessary to provide the County with the facilities, improvements, features, and functions in strict conformity with the General Requirements attached hereto as Attachment A, and as described in the Specifications and the Drawings included in the Bid Document Package. The Contractor agrees to complete the Work in a good, firm, substantial and workmanlike manner in strict conformity with this Contract.

(1) The Work relates to the following Project:

(2) Work not included in this Contract (*if applicable*):

B. Unless otherwise stipulated, the Contractor shall furnish all of the Work in accordance with the Contract and all incidental work necessary to complete the Project in an acceptable manner, ready for use, occupancy, or operation by the County. The Contractor shall be responsible for the entire Work and every part thereof.

II. TIME, TERM AND LIQUIDATED DAMAGES

A. **Contract Time.** The Contractor shall commence the Work under this Contract within ten (10) days from the date on the Notice to Proceed. Contractor shall fully complete the Work within _____ calendar days from and including the date on the Notice to Proceed. If the Change Order only seeks to extend the Contract Time, it may be approved and executed by the DeKalb County Chief Executive Officer or his/her designee and the Contractor in accordance with the terms of this Contract.

SAMPLE

B. **Contract Term.** As required by O.C.G.A §36-60-13, this Contract shall commence immediately upon the execution date. This Contract shall (i) terminate without further obligation on the part of the County each and every December 31st, as required by O.C.G.A. § 36-60-13, as amended, unless terminated earlier in accordance with the termination provisions of this Contract; (ii) automatically renew on each January 1st, unless terminated in accordance with the termination provisions of this Contract; and (iii) terminate absolutely, with no further renewals, on December 31, 20___ , unless extended by Change Order adopted and approved by the DeKalb County Governing Authority and the Contractor in accordance with the terms of this Contract.

OR

B. **Contract Term.** *(May be used for public works construction contracts for waste-water treatment, storm-water, water or sewer system or any combination of such systems)* As allowed by O.C.G.A. §36-60-15.1, this Contract shall commence immediately upon the execution date. This Contract shall terminate without further obligation on the part of the County, with no further renewals, on _____, 20_____, unless extended by Change Order adopted and approved by the DeKalb County Governing Authority and the Contractor in accordance with the terms of this Contract.

C. **Liquidated Damages.** The Contractor acknowledges that time is of the essence with respect to the Work governed by this Contract. Contractor acknowledges and recognizes that if it fails to achieve Substantial Completion of any portion of the Work within the Contract Time as may be extended in accordance with the terms of this Contract, the County will sustain substantial losses as a result of such failure. The Contractor further acknowledges that the County will suffer damages that are difficult if not impossible to accurately estimate. Contractor shall pay liquidated damages of _____Dollars ($_____) for each day that Substantial Completion of the Work is delayed past the Contract Time. The Contractor agrees that the foregoing rate is a reasonable pre-estimate of the probable damages that the County will suffer if Substantial Completion is delayed, and said daily rate is intended to compensate the County for its damages and is not intended to penalize the Contractor for its delay. The County may deduct such liquidated damages from any unpaid amounts then or thereafter due the Contractor under this Contract. Any liquidated damages not deducted from any unpaid amounts due the Contractor are payable to the County at the County's demand, together with interest from the date of the demand at a rate equal to seven percent (7%) per annum.

III. PAYMENT

A. **Contract Price.** As full payment for the faithful performance of this Contract, the County shall pay the Contractor, the Contract Price, which is an amount not to exceed **_____ ($_____)**, unless changed by written Change Order in accordance with the terms of this Contract. The term "Change Order" includes the term "amendment" and shall mean a written order authorizing a change in the Work, and an adjustment in Contract Price to Contractor or the Contract Term, as adopted and approved by the Contractor and the DeKalb County Governing Authority, or the Chief Executive Officer, if exempted from

SAMPLE

Governing Authority adoption and approval in accordance with the express terms of this Contract. The Chief Executive Officer or his/her designee shall have the authority to approve and execute a Change Order lowering the Contract Price or increasing the Contract Price up to twenty percent (20%) of the original Contract Price, provided that the total amount of the increase authorized by such Change Order is less than $100,000.00. If the original Contract or Purchase Order Price does not exceed $100,000.00, but the Change Order will make the total Contract Price exceed $100,000.00, then the Change Order will require approval by official action of the Governing Authority. Any other increase of the Contract Price shall be by Change Order adopted and approved by the DeKalb County Governing Authority and the Contractor in accordance with the terms of this Contract. Amounts paid to the Contractor shall comply with and not exceed Attachment A, the Contractor's Cost Proposal, consisting of _____ page(s) attached hereto and incorporated herein by reference. Payment is to be made no later than thirty (30) days after submittal of undisputed invoice.

B. **Retainage and Partial Payments.** Partial payments to the Contractor shall be made monthly, based on the value of Work completed as determined by the County, plus the value of materials and equipment suitably stored, insured and protected at the construction site. The Contractor shall submit a payment request for Work completed during the preceding calendar month to _____ for review and approval on or before last day of each month. If approved by the Project Manager or Designated Representative, the approved amount, less retainage, shall be paid to the Contractor thirty (30) days after the date the approved payment request is received by the County Finance Department. If a payment request is not approved by the County, then no payment shall be made to the Contractor until after the Project Manager or Designated Representative approves the payment request. The amount of retainage shall be as follows:

(1) Ten percent (10%) of each partial payment shall be withheld as retainage until the value of fifty percent (50%) of the Contract Price, including Change Orders and other authorized additions provided in the Contract, is due;

(2) When fifty percent (50%) of the Contract Price, as described above, becomes due and the manner of completion of the Work and its progress, quality, schedule are reasonably satisfactory to the County, and there are no outstanding claims by the Contractor, Subcontractors, lower tier subcontractors, as that term is defined by state law, or Suppliers, the withholding of retainage shall be discontinued.

(3) If after discontinuing retainage, the County determines that the Work is unsatisfactory or has fallen behind schedule, withholding of ten percent (10%) of each request for payment may be resumed. When the Work has reached Substantial Completion and the County determines the Work to be reasonably acceptable, the Contractor shall submit an invoice or other documents as may be required and receive payment of retainage within thirty (30) days. If minor items remain incomplete at that time, an amount equal to two hundred percent (200%) of the value of each item, as determined by the County, shall be withheld until such items are completed.

SAMPLE

(4) The Contractor shall within ten days from the Contractor's receipt of each payment from the County pass through payments to Subcontractors and shall reduce each Subcontractor's retainage in the same manner as the Contractor's retainage is reduced by the County. The Subcontractor shall, within ten days from the Subcontractor's receipt of payment, pass through payments to lower tier subcontractors and shall reduce each lower tier subcontractor's retainage in the same manner as the Subcontractor's retainage is reduced.

(5) Contractor and County agree to abide by all applicable provisions of Georgia state law concerning retainage, including but not limited to O.C.G.A. § 13-10-80 and 13-10-81. If the terms of this contract concerning retainage conflict with state law, state law governs.

(6) *For contracts relating to the installation, extension, improvement, maintenance or repair of any water or sewer facility add the following provision:* As required by O.C.G.A. § 13-10-81, Retainage shall be invested by the County at the current market rate and any interest earned on the retained amount shall be paid to the Contractor when the Project has been completed within the time limits specified and for the price specified in this Contract or in change orders approved in accordance with the terms of this Contract, upon the County's receipt of certification by the engineer in charge of the Project in the manner and form required by O.C.G.A. §13-10-81.

C. **Payment Requests and Invoices.** Payment Requests and invoice(s) must be submitted as follows:

(1) Original(s) must be submitted to:

Insert User Department Address here.

(2) Upon award, Prime Contractor(s) with Local Small Business Enterprise (LSBE) Subcontractor(s) shall enter utilization reports electronically at www.dekalblsbe.info. Proof of payment to the LSBE Subcontractor must be uploaded and submitted. LSBE Subcontractors shall confirm receipt of payment from the Prime, electronically also, at www.dekalblsbe.info.

D. **Title.** All equipment, materials, and Work covered by partial payments shall, upon payment thereof, become the sole property of the County, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of equipment, materials, and Work upon which payments have been made, or the restoration of any damaged Work.

E. **Final Payment.** Within sixty (60) days after the Work is fully completed and accepted by the County, the balance due hereunder shall be paid; provided, however, that final payment shall not be made until said Contractor shall have completed all Work necessary

SAMPLE

and reasonably incidental to the Contract, including final cleanup and restoration. Acceptance of the Work and the making of final payment shall not constitute a waiver of any claims by the County. All claims by the Contractor for breach of contract, violation of state or federal law, or compensation and extensions of time shall be submitted in writing to the Chief Executive Officer within sixty (60) days after completion and acceptance of the Work as herein provided, or all such claims shall be forever barred.

IV. NOTICE

Any notice or consent required to be given by or on behalf of any party hereto to any other party hereto shall be in writing and shall be sent to the County's Chief Executive Officer and the Executive Assistant or to the Contractor or his authorized representative on the work site by (a) registered or certified United States mail, return receipt requested, postage prepaid, (b) personal delivery, or (c) overnight courier service. All notices sent to the addresses listed below shall be binding unless said address is changed in writing no less than fourteen days before such notice is sent. Future changes in address shall be effective upon written notice being given by the Contractor to the County's Executive Assistant or by the County to the Contractor's authorized representative via certified first class U.S. mail, return receipt requested. Such notices will be addressed as follows:

If to the County:

Chief Executive Officer
The Maloof Center
1300 Commerce Drive, 6th Floor
Decatur, Georgia 30030

and

Executive Assistant
The Maloof Center
1300 Commerce Drive, 6th Floor
Decatur, Georgia 30030

With a copy to: Director of the Department of Purchasing and Contracting
The Maloof Center
1300 Commerce Drive, 2nd Floor
Decatur, Georgia 30030

With a copy to: _____
_____
_____
_____

If to the Contractor:

SAMPLE

With a copy to: *(Insert Contractor name and address)*

_____
_____
_____
_____

V. FEDERAL WORK AUTHORIZATION

A. Pursuant to O.C.G.A. §13-10-91, the County cannot enter into a contract for the physical performance of services unless the Contractor, its Subcontractor(s) and sub-subcontractor(s), as that term is defined by state law, register and participate in the Federal Work Authorization Program to verify specific information on all new employees.

B. Contractor certifies that it has complied and will continue to comply throughout the Contract Term with O.C.G.A. §13-10-91 and any related and applicable Georgia Department of Labor Rule.

C. Contractor agrees to sign an affidavit evidencing its compliance with O.C.G.A. §13-10-91. The signed affidavit is attached to this Contract as Attachment B.

D. Contractor agrees that in the event it employs or contracts with any Subcontractor(s) in connection with this Contract, Contractor will secure from each Subcontractor an affidavit that certifies the Subcontractor's current and continuing compliance with O.C.G.A. §13-10-91 throughout the Contract Term. Any signed Subcontractor affidavit(s) obtained in connection with this Contract shall be attached hereto as Attachment C.

E. Each Subcontractor agrees that in the event it employs or contracts with any sub-subcontractor(s), each Subcontractor will secure from each sub-subcontractor an affidavit that certifies the sub-subcontractor's current and continuing compliance with O.C.G.A. §13-10-91 throughout the Contract Term. Any signed sub-subcontractor affidavit(s) obtained in connection with this Contract shall be attached hereto as Attachment D.

VI. CORPORATE AUTHORITY

Contractor agrees to execute the Certificate of Corporate Authority, attached hereto as Attachment E. The officials of the Contractor executing this Contract are duly and properly in office and are fully authorized and empowered to execute the same for and on behalf of the Contractor. Contractor warrants that it has all requisite power and authority to enter into and perform its obligations under this Contract, and that the execution and delivery by the Contractor of this Contract and the compliance by the Contractor with all of the provisions of this Contract (i) is within the purposes, powers, and authority of the Contractor; (ii) has been done in full compliance with applicable law and has been approved by the governing body of the Contractor

SAMPLE

and is legal and will not conflict with or constitute on the part of the Contractor a violation of or a breach of or a default under any indenture, mortgage, security deed, pledge, note, lease, loan, or installment sale agreement, contract, or other agreement or instrument to which the Contractor is a party or by which the Contractor is otherwise subject or bound, or any license, judgment, decree, law, statute, order, writ, injunction, demand, rule, or regulation of any court or governmental agency or body having jurisdiction over the Contractor; and (iii) has been duly authorized by all necessary action on the part of the Contractor. This Contract is the valid, legal, binding and enforceable obligation of the Contractor.

VII. PERFORMANCE AND PAYMENT BONDS AND INSURANCE REQUIREMENTS

A. Within ten (10) days from the date of Notice of Award of this Contract, the Contractor, as principal, shall give a Contract performance bond, attached hereto as Attachment F and a payment bond, attached hereto as Attachment G, each in the amount of $ _____, for the use of all persons doing work or furnishing skills, tools, machinery, or materials under or for the purpose of this Contract, in accordance with the applicable provisions of Georgia state law, including but not limited to, O.C.G.A. §13-10-1 and §36-91-21 *et seq.* The bonds shall be underwritten by a surety company licensed to write bonds in the State of Georgia, listed in the most current U.S. Treasury Circular No. 570, and which have a current A.M. Best rating of "A" (Excellent) with a Financial Size Category of XII or better. The life of these bonds shall extend throughout the Contract Term including a sixty (60) day maintenance period (where applicable) and a twelve-month guarantee period after the completion of Work performed under this Contract. The bonds shall issue on the forms provided by the County as part of this Contract.

B. It is further agreed between the parties hereto that if at any time after the execution of this Contract and the surety bonds, the County shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease to be adequate to cover the performance of the Work, the Contractor shall, at its sole expense and within five (5) days after the receipt of notice from the County to do so, furnish additional bond or bonds in such form and amount and with such surety or sureties as shall be satisfactory to the County.

C. The Contractor shall, without expense to the County, provide certificates of insurance, and copies of signed insurance policies including declarations pages from companies that are authorized to engage in the insurance business in the state of Georgia and are otherwise acceptable to the County Finance Director or his/her designee, attached hereto as Attachment H. Such insurance shall be placed with admitted insurers that maintain an A.M. Best's rating of not less than A (Excellent) with a Financial Size Category of VII or better with coverage forms acceptable to Contractor. The insurance described below shall be maintained uninterrupted for the duration of the project, including any warranty periods, and shall protect Contractor, and others as required by contract, for liabilities in connection with work performed by or on behalf of Contractor, its agents, representatives, employees or Contractors.

SAMPLE

(1) *Workers Compensation Insurance*. Statutory workers compensation insurance is to be provided in compliance with the requirements of Georgia law with limits not less than the following:

Employer's liability insurance by accident, each accident	$1,000,000
Employer's liability insurance by disease, policy limit	$1,000,000
Employer's liability insurance by disease, each employee	$1,000,000

(2) *Commercial General Liability Insurance.* Commercial general liability insurance is to be provided with limits not less than the following:

$1,000,000 per occurrence for bodily injury and property damage liability
$1,000,000 personal and advertising injury liability
$2,000,000 general aggregate
$2,000,000 products-completed operations aggregate
$ 100,000 damage to rented premises (each occurrence)
$ 5,000 medical expense (any one person)

(3) *Umbrella or Excess Insurance.* Umbrella or excess insurance is to be provided with General Liability, Auto Liability and Employers Liability scheduled as underlying policies with limits not less than the following:

$5,000,000 per occurrence
$5,000,000 aggregate

(4) *Comprehensive Automobile Liability Insurance*. Comprehensive automobile liability insurance with form coverage is to be provided for all owned, non-owned and hired vehicles with combined single limit of $1,000,000. Automobile liability insurance shall be written on ISO Business Auto Coverage Form CA 0001 (1990 edition or later), or a substitute form providing equivalent coverage, and shall cover liability for bodily injury and property damage arising from the use or operation of any automobile, including those owned, hired or otherwise operated or used by or on behalf of Contractor. The policy must include Broadened Pollution Liability Endorsement CA9948 12 93.

(5) *Builder's Risk Insurance Coverage (If Applicable)*. DeKalb County shall procure and maintain Builders Risk Insurance on the entire work which provides "All-risk" form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism, malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by Supplementary Conditions) until

SAMPLE

Final Completion and Acceptance of the Project. Such policy of insurance shall contain at least the following sub-limits of insurance and deductibles:

Sub-limits:	
Property in Transit	$1,000,000
Property in Offsite Storage	$1,000,000
Plans & Blueprints	$25,000
Debris Removal	25% of Insured Physical Loss
Delay in Completion / Soft Cost	TBD
Ordinance of Law (Increased Cost of Construction)	$1,000,000
Flood and Earthquake	TBD – Full Contract Value
Deductibles:	
Flood and Earthquake	$25,000
Water Damage other than Flood	$100,000
All other Perils	$10,000

D. The County, its elected officials, officers, employees and agents, hereinafter referred to in this article and in the article entitled "Certificates of Insurance" as "the County and its officers" are to be named as additional insured on all policies of insurance except worker's compensation insurance with no cross suits exclusion. The County and its officers shall be included as additional insureds under commercial general liability and commercial umbrella insurance, for liabilities arising out of both the ongoing and completed operations of Contractor. Such additional insured coverage shall be endorsed to Contractor's policy by attachment of ISO Additional Insured Endorsement forms CG 20 10 10 01 (ongoing operations) and CG 20 37 10 01 (products-completed operations), or form(s) providing equivalent coverage.

E. All coverages required of the Contractor will be primary over any insurance or self-insurance program carried by the County.

F. If the Contractor is a joint venture involving two (2) or more entities, then each independent entity will satisfy the limits and coverages specified here or the joint venture will be a named insured under each respective policy specified.

G. In addition to procuring and maintaining commercial general liability insurance, automobile liability and commercial umbrella insurance, for the Contract Term, Contractor shall continue to procure and maintain the products-completed operations liability insurance coverage and commercial umbrella insurance after the Work is substantially complete for the entire Contract Term or for the applicable five-year statutory limitation, whichever is greater. For such period of time, all terms and conditions of such coverage shall remain unchanged, including the limits specified herein and the requirement to provide the County with coverage as an additional insured.

SAMPLE

H. Contractor agrees to waive all rights of subrogation and other rights of recovery against the County and its officers and shall cause each Subcontractor to waive all rights of subrogation for all coverage.

I. Failure of the County to demand such certificate or other evidence of full compliance with these insurance requirements or failure of the County to identify a deficiency from evidence provided will not be construed as a waiver of the Contractor's obligation to maintain such coverage.

J. Contractor understands and agrees that the purchase of insurance in no way limits the liability of the Contractor.

VIII. CERTIFICATES OF INSURANCE

A. Certificates shall state that the policy or policies shall not expire, be cancelled or altered without at least sixty (60) days prior written notice to the County. Policies and Certificates of Insurance listing the County and its officers as additional insureds (except for workers' compensation insurance) shall conform to all terms and conditions (including coverage of the indemnification and hold harmless agreement) contained in this Contract.

B. The Contractor agrees to name the County and its officers as additional insured on the commercial general liability insurance, using the ISO Additional Insured Endorsement forms CG20101001 (ongoing operations) and CG20371001 (products-completed operations) forms, or form(s) providing equivalent coverage.

C. Certificates of Insurance must contain the policy number, policy limits, and policy expiration date of all policies issued in accordance with this Contract; the location and operations to which the insurance applies. Certificates must be provided annually for the duration of the project. If applicable, a specific statement must be included that blasting coverage is included to the extent such risk is present; that Contractor's protective coverage applies to any Subcontractor's operations; and Contractor's contractual liability insurance coverage applies to any Subcontractor.

D. This insurance for the County as the additional insured shall be as broad as the coverage provided for the named-insured Contractor. It shall apply as primary insurance before any other insurance or self-insurance, including any deductible, non-contributory, and waiver of subrogation provided to the County as the additional insured.

E. The Contractor shall be wholly responsible for securing certificates of insurance coverage as set forth above from all Subcontractors who are engaged in the Work.

F. If the County shall so request, the Contractor will furnish the County for its inspection and approval such policies of insurance with all endorsements, or confirmed specimens thereof certified by the insurance company to be true and correct copies.

SAMPLE

G. Contractor shall be responsible and have the financial wherewithal to cover any deductibles or retentions included on the certificate of insurance.

H. Such certificates should be sent to the County and must identify the "Certificate Holder" as follows:

DeKalb County, Georgia
Director of Purchasing & Contracting
The Maloof Center
1300 Commerce Drive, 2nd Floor
Decatur, Georgia 30030

I. Copies of Required Insurance policies with Declarations Page(s) shall be attached hereto as Attachment H.

IX. ATTACHMENTS

A. This Contract includes the following Attachments all of which are incorporated herein by reference:

Attachment A, General Requirements, GR-1 through GR-46.

Attachment B, Contractor's Affidavit.

Attachment C, Subcontractor's Affidavit(s).

Attachment D, Sub-subcontractor's Affidavit(s).

Attachment E, Certificate of Corporate Authority or Joint Venture Certificates

Attachment F, Performance Bond and Accompanying Power of Attorney

Attachment G, Payment Bond and Accompanying Power of Attorney

Attachment H, Copies of Required Insurance policies with Declarations Page(s)

B. In addition to the foregoing, the Bid Document Package dated_____, the original of which is maintained in the County's Department of Purchasing and Contracting, forms an essential part of this Contract as if fully set out herein.

IX. FUNDING CLAUSE
(If Applicable)

SAMPLE

The Contractor has been informed and understands that funding for this Contract is provided under the _____ Act and expressly agrees that performance of the Contract, in whole or in part, is contingent upon and subject to the availability of such funding under the _____ Act to DeKalb County, Georgia.

X. FEDERAL AND/OR STATE FUNDING/LAW

(If Applicable)

Insert any requirements pertaining to Federal and/or State funding requirements or other legal requirements.

[SIGNATURES APPEAR ON NEXT PAGE]

SAMPLE

IN WITNESS WHEREOF, the parties hereto have set their hands and caused their seals to be affixed hereupon in four (4) counterparts, each to be considered as an original by their authorized representatives.

NAME OF CONTRACTOR

By: _____
Signature (SEAL)

_____
Name (Typed or Printed)

_____
Title

_____
Federal Tax I.D. Number

_____
Date

ATTEST:

_____
Signature

_____
Name (Typed or Printed

_____
Title

APPROVED AS TO SUBSTANCE:

_____
DeKalb County Department
Director

DEKALB COUNTY, GEORGIA

_____ **by Dir.**(SEAL)
MICHAEL L. THURMOND
Chief Executive Officer
DeKalb County, Georgia

_____
Date

ATTEST:

_____
BARBARA H. SANDERS, CCC
Clerk of the Chief Executive Officer
and Board of Commissioners of
DeKalb County, Georgia

APPROVED AS TO FORM:

_____
County Attorney Signature

_____
County Attorney Name
(Typed or Printed)

SAMPLE

ATTACHMENT A

GENERAL REQUIREMENTS

INDEX TO GENERAL REQUIREMENTS

Section	Title
GR-1	Definitions of Terms .....
GR-2	Prior Use by County.....
GR-3	Contractor's Obligations.....
GR-4	Authority of the County .....
GR-5	Changes in the Work and Change Orders.....
GR-6	Time for Completion.....
GR-7	Schedules, Reports, and Records .....
GR-8	County's Right to Suspend or Terminate Work .....
GR-9	Final Inspection .....
GR-10	Warranties, Guarantees and Correction of Work.....
GR-11	Contractor's Personnel and Independent Contractor Status .....
GR-12	Subcontracting .....
GR-13	Assignments.....
GR-14	Indemnification and Hold Harmless .....
GR-15	Royalties and Patents .....
GR-16	Laws and Regulations.....
GR-17	Permits and Inspection Fees.....
GR-18	Land and Rights-of-Way.....
GR-19	Protection of Work, Property, and Persons.....
GR-20	Prohibited Interests .....
GR-21	First Source Jobs Ordinance .....
GR-22	Foreign Corporations .....
GR-23	Specification and Drawings .....
GR-24	Contractor's Submittals .....
GR-25	As-Built Drawings .....
GR-26	Examination of Work by Contractor.....
GR-27	Inspection and Testing of Materials.....
GR-28	Inspection of Work .....
GR-29	Requests for Substitutions.....
GR-30	Rejections of Work and Materials .....
GR-31	Materials, Services, and Facilities .....
GR-32	Utilities During Construction.....
GR-33	Temporary Heat and Air Conditioning .....
GR-34	Maintenance Manual.....
GR-35	Weather Conditions .....
GR-36	Lines, Grades, and Measurements .....
GR-37	Cleaning Up .....

SAMPLE

GR-38 Barricades .....
GR-39 No Third-Party Beneficiary…….
GR-40 Severability .....
GR-41 Interpretation.....
GR-42 Prior Contracts; Conflict in Documents……..
GR-43 Entire Agreement…….
GR-44 Counterparts.....
GR-45 Venue .....
GR-46 Right to Audit……

SAMPLE

GR-1. DEFINITIONS OF TERMS

The section captions contained in this Contract are for convenience only and do not in any way limit or amplify any term or provision hereof. The use of the terms "hereof," "hereunder" and "herein" shall refer to this Contract as a whole, inclusive of the Attachments, except when noted otherwise. The use of the masculine or neuter genders herein shall include the masculine, feminine and neuter genders and the singular form shall include the plural when the context so requires. The following terms shall have the meanings indicated:

"Addendum" or "Addenda" shall mean written or graphic instruments issued prior to the execution of the Contract, which modify or interpret the Work, or the Invitation to Bid by additions, deletions, clarifications, or corrections.

"Bid" shall mean the offer of the Bidder submitted on the prescribed form setting forth the price(s) for the Work to be performed.

"Bid Document Package" shall consist of documents entitled as follows: Acknowledgement of Contractor, Advertisement for Bids, Instructions to Bidders, Addenda, Business License, Utility Systems Contractor's License, Utility Manager's Certificate, Utility Foreman's Certificate, General Contractor's License, Bidder's Lump Sum Cost, Bidder's Unit Price, First Source Jobs Ordinance Information with Exhibits, LSBE Program Information Sheet with LSBE Exhibits, Certificate of Corporate Bidder, Certificate of Authority/Joint Venture, Bidder's Affidavit of Compliance with O.C.G.A.13-10-91, Reference and Release Form, Preferred Employee Tracking Form, Subcontractor Tracking Form, Bid Bond and Power of Attorney, Public Works Construction Affidavit and Oath of Successful Bidder, Technical Specifications, and Drawings.

"Bidder" shall mean any person, firm, or corporation submitting a Bid for the Work.

"Bonds" shall mean bid, performance, and payment bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract.

"Change Order" includes the term "amendment" and shall mean a written order authorizing a change in the Work, if applicable, and an adjustment in the Contract Price, Contract Time or Contract Term, as adopted and approved by the Contractor and the DeKalb County Governing Authority, or the Chief Executive Officer, if exempted from Governing Authority adoption and approval in accordance with the express terms of this Contract.

"Contract" or "Agreement" shall consist of the written Contract executed by the parties, all attachments to the Contract, Change Orders, Field Orders, and the Bid Document Package. The intent of these documents is for the Contractor to furnish all materials, appliances, tools, labor and services of every kind necessary for the proper execution of the Work, and the terms and conditions of payment therefore.

"Contract Price" shall mean the total monies payable to the Contractor under the terms and conditions of the Contract.

SAMPLE

"Contract Time" shall mean the number of days stated in the Contract for the completion of the Work.

"Contract Term" shall mean the length of time the Contract shall remain in effect.

"Contractor" or "General Contractor" shall mean the individual, firm, joint venture or corporation undertaking the execution of the Work as an independent contractor under the terms of the Contract and acting through his or its agents or employees.

"County" shall mean DeKalb County, Georgia.

"Day(s)" shall mean calendar day(s).

"Drawings" shall mean the part of the Contract which shows, largely through graphical presentation, the characteristics and scope of the Work to be performed and which have been prepared or approved by the County. The Drawings are included in the Bid Document Package.

"Field Order" shall mean a written order issued by an authorized County official/employee to the Contractor during construction effecting a change in the Work by authorizing an addition, deletion, or revision in the Work within the general scope of the Work not involving an adjustment in the Contract Price or a change to the Contract Time or Term. No Field Order shall be valid or effective unless it is signed by the County employee(s) who has been authorized in writing by the Chief Executive Officer or his/her designee to execute Field Orders.

"Notice of Award" shall mean a written notice of the acceptance of the Bid from the County to the successful Bidder.

"Notice to Proceed" shall mean a written communication issued by the County authorizing the Contractor to proceed with the Work and establishing the date of commencement of the Work. The effective date of the Notice to Proceed shall be the date set forth on the Notice to Proceed.

"Project" shall mean the undertaking to be performed as provided in the Contract.

"Shall" is mandatory; "may" is permissive.

"Specifications" or "Technical Specifications" shall mean a part of the Contract consisting of written descriptions of a technical nature regarding materials, equipment, construction systems, standards, and workmanship specified for this Project.

"Subcontractor" shall mean any person, firm, or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work.

"Submittals" shall mean all shop drawings, diagrams, illustrations, brochures, schedules, samples, and other data which are prepared by the Contractor, a Subcontractor, manufacturer,

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Supplier, or distributor, which illustrate how specific portions of the Work shall be fabricated or installed.

"Substantial Completion" or "Substantial Completion of the Work" shall mean that date determined by the County when the construction of the Project or an expressly stipulated part thereof is sufficiently completed, in accordance with the Contract, so that the Project or stipulated part can be fully utilized for the purposes for which it is intended.

"Superintendent" shall mean the Contractor's authorized on-the-job representative designated in writing by the Contractor prior to commencement of any work.

"Supplier" shall mean any person, supplier, or organization who furnishes materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

"Work" shall have the meaning assigned to that term in the article in the Contract entitled Scope of Work."

GR-2. PRIOR USE BY COUNTY

Prior to completion of the Work, the County may take over operation and/or use of the Project or portions thereof. Such prior use of facilities by the County shall not be deemed as acceptance of any Work or relieve the Contractor from any of the requirements of the Contract.

GR-3. CONTRACTOR'S OBLIGATIONS

The Contractor shall, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities, and all things necessary or proper to perform and complete all the Work within the time herein specified and in accordance with the provisions of this Contract, the Specifications, the Drawings, and any and all supplemental drawings pertaining to the Work. Contractor shall furnish, erect, maintain, and remove such construction, plants, and such temporary works as may be required. Contractor alone shall be responsible for the safety, efficiency, and adequacy of its plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance, or operation. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations imposed by the Contract and local ordinances, and state and federal laws; and shall do, carry on, and complete the entire Work.

GR-4. AUTHORITY OF THE COUNTY

A. The Contractor shall perform all of the Work under the general direction, and to the entire satisfaction, approval, and acceptance of the County. The County shall decide all questions relating to measurements of quantities, the character and

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acceptability of the Work performed, and as to whether the rate of progress is such that the Work will be completed within the time limit of the Contract. All questions as to the meaning of the Drawings and the Specifications will be decided by the County.

B. The approval of the County of any materials, plant, equipment, Drawings, or of any other items executed, or proposed by the Contractor, shall be construed only to constitute an approval of general design. Such approval shall not relieve the Contractor from the performance of the Work in accordance with the Contract, or from any duty, obligations, performance guarantee, or other liability imposed upon him by the provisions of the Contract.

C. Whenever in this Contract, the words "directed," "required," "permitted," "ordered," or words of like import are used, it shall be understood that the direction, requirement, permission, or order of the County is intended, and similar words, "approved," "acceptable," "satisfactory," or words of like import shall mean approved by, acceptable to, or satisfactory to the County.

GR-5. CHANGES IN THE WORK, FIELD ORDERS, AND CHANGE ORDERS

A. All changes, alterations, or instructions in regard to any feature of the Work that differ from the Drawings and Specifications must be approved in writing by Field Order or Change Order in all cases. No verbal instruction or order will be regarded as a basis for a claim for extra compensation or time.

B. If a minor change in the Work is found to be necessary due to actual field conditions, the Contractor shall submit detailed drawings and written notification of the problems necessitating such departure for approval by the County before making the change. If the Contractor fails to make such request, no excuse will be entertained thereafter for Contractor's failure to carry out the Work in the required manner and to provide required guarantees, warranties, and Bonds, and Contractor shall not be entitled to any change in the Contract Price, Contract Time or the Contract Term.

C. The County may at any time, by issuing a Field Order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the County unless such Field Order entitles the Contractor to a change in Contract Price, Time, and/or Term, in which event the Contractor shall give the County written notice thereof within fifteen (15) days after the receipt of the ordered change, and the Contractor shall not execute such changes until it receives an executed Change Order from the County. No extra cost or extension of time shall be allowed unless approved by the County and authorized by execution of a Change Order.

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D. The County may at any time order changes within the scope of the Work without invalidating the Contract.

E. No claims for extra cost or time will be considered based on an escalation of prices throughout the Contract Term. The value of any work covered by a Change Order or of any claim for increase or decrease in the Contract Price shall be determined by one of the following methods in the order of precedence listed below.

(1) Unit prices previously approved.

(2) An agreed lump sum.

(3) The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the changed Work. In addition, there shall be added an amount agreed upon but not to exceed fifteen percent (15%) of the actual cost of such work to cover the cost of general overhead and profit.

F. The parties' execution of any Change Order constitutes a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct or indirect costs associated with such change and any and all adjustment to the Contract Price and the construction schedule. In the event a Change Order increases the Contract Price, Contractor must include the Work covered by such Change Orders in requests for payment as if such Work were originally part of the Contract.

GR-6. TIME FOR COMPLETION

A. The Contractor understands and agrees that the date of the beginning of Work, rate of progress, and time for completion of the Work are essential conditions of this Contract.

B. The Contractor agrees that the Work shall be executed regularly, diligently, and uninterrupted at such rate of progress as will insure its full completion thereof within the Contract Time. It is expressly understood and agreed, by and between the Contractor and the County, that the time for the completion of the Work described herein is a reasonable time for the completion of the same, taking into consideration the average climate range and usual industrial conditions prevailing in this locality.

C. If extraordinary adverse weather conditions are the basis for a claim for additional time, such claim shall be supported by the attachment of records of the National Oceanic and Atmospheric Administration showing meaningful variances from historic trends thereby substantiating the fact that weather conditions were

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abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction activities. The Contractor shall be entitled to an extension of the Contract Time only for extraordinary adverse weather conditions that unavoidably delay activities scheduled at that time, and then only for the number of days of delay which are due solely to such extraordinary adverse weather conditions. The Contractor is not entitled to any costs associated with extraordinary adverse weather conditions.

D. The County shall not be liable to the Contractor or any Subcontractor for claims or damages of any nature caused by or arising out of delays, regardless of cause. The sole remedy against the County for delays shall be the allowance of additional time for completion of the Work, the amount of which shall be based on actual and unavoidable delay.

GR-7. SCHEDULES, REPORTS, AND RECORDS

A. The Contractor shall submit to the County such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data as the County may request concerning the Work performed or to be performed. The Contractor shall also submit a schedule of payments that he anticipates earning during the course of the Work.

B. That Contractor shall coordinate and hold a meeting with its major Subcontractors and the County to discuss the Project schedule. Such meeting shall be held prior to Commencement of the Work under this Contract, but in no event later than ten (10) days after execution of this Contract by all parties. At that meeting, the Contractor shall present a draft Project schedule, and the Contractor and its Subcontractors shall, in collaboration with the County, assist in the preparation of a detailed and specific construction schedule. The Contractor shall be responsible for preparing and updating such schedule, which shall be complete in all respects and shall, when approved by the County, become the Construction Schedule and be automatically incorporated into the Contract and shall not be changed without the prior written consent of the County. The Construction Schedule shall not exceed the Contract Time, shall be revised and updated at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract, shall utilize Critical Path Method (CPM) software that is compatible with County software, and shall provide for expeditious and practicable execution of the Work. The Construction Schedule shall be cost-loaded.

C. The Construction Schedule shall, in such detail as the County may require, show the order in which Contractor will carry on the Work, including dates on which the various parts of the Work will start, and the estimated date of completion of each part. It shall also depict all requisite shop drawing submittals and approvals,

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manufacturing, fabrication, the installation of materials, supplies and equipment, testing, start-up, and training.

D. The Contractor shall prepare and keep current, for the County's approval, a schedule of submittals which is coordinated with the Construction Schedule and allows the County reasonable time to review submittals. The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the County.

E. In the event the County determines that the performance of the Work has not progressed or reached the level of completion required by the Contract, the County will have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime; (2) supplying additional manpower, equipment, and facilities; and (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures must continue until the progress of the Work complies with the stage of completion required by the Contract and the Construction Schedule. The County's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Construction Schedule. The Contractor is not entitled to an adjustment in the Contract Price for undertaking Extraordinary Measures required by the County. The County may exercise the rights furnished the County under or pursuant to this paragraph as frequently as the County deems necessary to ensure that the Contractor's performance of the Work will comply with the completion date set forth in the Contract as the Contract Time.

GR-8. COUNTY'S RIGHT TO SUSPEND OR TERMINATE WORK

A. *Termination for Convenience*. County may, for its own convenience and at its sole option, without cause and without prejudice to any other right or remedy of County, elect to terminate the Contract by delivering to the Contractor, at the address listed in the Notices article of this Contract, a written notice of termination specifying the effective date of termination. Such notice shall be delivered to Contractor at least thirty (30) days prior to the effective date of termination.

B. *Termination for Default*. If the Contractor is adjudged bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act or to reorganize under the bankruptcy or applicable laws, or if he fails to supply sufficient skilled workers or suitable materials or equipment, make payments to Subcontractors or for labor, materials or equipment, or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the Work, or if he otherwise violates any provision of the Contract, then the County may, without prejudice to

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any other right or remedy, and after giving the Contractor and his surety a maximum of seven (7) days from delivery of a written notice, declare the Contract in default and terminate this Contract. In that event, the County may take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor. The County may cause the Work to be completed and corrected by whatever method it deems expedient. If called upon by the County to finish the Work, the Contractor's surety shall promptly do so. In any case, the Contractor and its surety shall be liable to the County for any and all damages and costs incurred by the County as a result of any default by the Contractor, including without limitation all costs of completion or correction of the Work, liquidated damages, attorneys' fees, expert fees, and other costs of dispute resolution. Termination of this Contract pursuant to this paragraph may result in disqualification of the Contractor from bidding on future County contracts for a period of time not to exceed five (5) years.

C. If Contractor's services are terminated by the County pursuant to paragraph A or B in this General Requirement, the termination will not affect any rights or remedies of the County then existing or which may thereafter accrue against Contractor or its surety. Any retention or payment of moneys due Contractor by County will not release Contractor from liability. If it is determined that the Contractor was not in default or that the failure to perform is excusable, a termination for default will be considered to have been a termination for the convenience of the County, and the rights and obligations of the parties shall be governed accordingly.

D. In case of termination of this Contract before completion of the Work, Contractor will be paid only for materials and equipment accepted by the County and the portion of the Work satisfactorily performed through the effective date of termination as determined by the County.

E. Except as otherwise provided in this General Requirement, neither party shall be entitled to recover lost profits, special, consequential or punitive damages, attorney's fees or costs from the other party to this Contract for any reason whatsoever.

F. The parties' obligations pursuant to this General Requirement shall survive any Acceptance of Work, or expiration or termination of this Contract.

GR-9. FINAL INSPECTION

Upon notice from the Contractor that the Work is completed, the County shall make a final inspection of the Work, and shall notify the Contractor of all instances where the Work fails to comply with the Drawings and Specifications, as well as any defects the County may discover. At no cost to the County, the Contractor shall immediately make such alterations as are

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necessary to bring the Work into compliance with the Contract, the Drawings, and Specifications.

GR-10. WARRANTIES, GUARANTEES AND CORRECTION OF WORK

A. The Contractor warrants to the County that materials and equipment furnished under the Contract will be new and of good quality, unless otherwise required or permitted by the Contract; that the Work will be free from defects not inherent in the quality required or permitted; and that the Work will conform to the requirements of the Contract. Work not conforming to these requirements, including substitutions not properly approved and authorized, is considered defective. The County, in its sole discretion, may exclude from the Contractor's warranty; remedies for damage or defect which the County determines were caused by abuse; modifications not executed by the Contractor; improper or insufficient maintenance; improper operation; and normal wear and tear and normal usage.

B. Upon the completion of the Work, and as a condition of final payment, the Contractor shall guarantee in writing that all Work has been accomplished in conformance with the Contract. If required by the County, the Contractor shall also furnish additional satisfactory evidence as to the kind and quality of materials and equipment.

C. The Contractor shall promptly, and in no event later than 48 hours after receiving written demand from the County, remedy any error, omission, defect, or non-compliance in the Work discovered by the County during construction or at any time thereafter until one year after the final completion of the Work. Nothing herein shall be deemed to shorten any statutory period of limitation otherwise applicable to any legal action by the County against the Contractor.

D. Contractor shall pay for any damage caused by any omission or defect in the Work, including without limitation, any damage to other improvements or facilities. In the event that the Contractor should fail to timely make repairs, adjustments, or other remedy that may be made necessary by such defects, the County may do so, and charge the Contractor the cost thereby incurred.

E. All warranties and guaranties shall extend for the greatest of one (1) full year commencing on the dates of Substantial Completion of the Project or such longer period of time as is required by the Contract. The one (1) year period shall be extended with respect to portions of the Work first performed after Substantial Completion for a period of one (1) year after the actual performance of the Work. If any defect or deviation should exist, develop, be discovered or appear within such one (1) year period, the Contractor, at it sole cost and expense and immediately upon demand, shall fully and completely repair, correct, and eliminate such defect. The foregoing warranties and guarantees are cumulative of

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and in addition to, and not restrictive of or in lieu of, any and all other warranties and guarantees provided for or required by law. No one or more of the warranties contained herein shall be deemed to alter or limit any other. The Performance Bond shall remain in full force and effect throughout the applicable guarantee period set forth in this paragraph.

F. Neither the final payment nor any provision of the Contract, nor partial or entire occupancy or use of the Work by the County, shall constitute an acceptance of any part of the Work that is not in accordance with the Contract or relieve the Contractor of liability for incomplete or faulty materials or workmanship.

G. All manufacturer warranties and guarantees shall be delivered to the County prior to Substantial Completion and such delivery shall be a condition precedent to the issuance of the Certificate of Substantial Completion. Before final payment, the Contractor shall assign and transfer to the County all guarantees, warranties and agreements from all contractors, Subcontractors, vendors, Suppliers, or manufacturers regarding their performance, quality of workmanship or quality of materials supplied in connection with the Work. The Contractor represents and warrants that all such guarantees, warranties and agreements will be freely assignable to the County, and that upon final completion of the Work, all such guarantees, warranties and agreements shall be in place and enforceable by the County in accordance with their terms. Contractor's obligations pursuant to this General Requirement shall survive any acceptance of Work, or termination or expiration of this Contract.

GR-11. CONTRACTOR'S PERSONNEL AND INDEPENDENT CONTRACTOR STATUS

A. The Contractor will supervise and direct the Work, including the Work of all Subcontractors. Contractor will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. An experienced Superintendent and necessary assistants competent to supervise the particular types of work involved shall be assigned to the Project by the Contractor, and shall be available at all times when work is in progress. The name of the Superintendent shall be submitted with qualifications of same prior to the start of the Work. If approved by the County, the Superintendent so named by the Contractor shall be employed by the Contractor and shall have served in a supervisory capacity on at least one Project of like description and size performed by the Contractor during the previous twelve months. Under no circumstances shall an employee of any Subcontractor serve as the Superintendent, unless approved by the County prior to being named Superintendent. The Superintendent shall represent the Contractor, and all directions given to the Superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

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B. The Contractor shall not change key members of its staff without the prior consent of the County, unless such staff members prove to be unsatisfactory to the Contractor and cease to be in its employ. If the Contractor intends to change a key staff member (defined as certain full-time personnel stationed at the site including Project Manager, Superintendent, Project Engineer, Assistant Project Manager, Assistant Superintendent, or Assistant Project Engineer) it shall give the County written notice at least fifteen (15) days prior to the intended change. The written notice shall include a description of qualifications for the new proposed key staff member. The County shall have the right to approve or disapprove the proposed key staff member.

C. Only persons skilled in the type of work which they are to perform shall be employed. The Contractor shall, at all times, maintain discipline and good order among his employees, and shall not employ any unfit person or persons or anyone unskilled in the work assigned him.

D. The relationship between the County and the Contractor shall be that of owner and independent contractor. Other than the consideration set forth herein, the Contractor, its officers, agents, servants, employees, and any Subcontractors shall not be entitled to any County employee benefits including, but not limited to social security, insurance, paid annual leave, sick leave, worker's compensation, free parking or retirement benefits. All services provided by Contractor shall be by employees of Contractor or its Subcontractors and subject to supervision by Contractor. No officer or employee of Contractor or any Subcontractor shall be deemed an officer or employee of the County. Personnel policies, tax responsibilities, social security payments, health insurance, employee benefits and other administrative policies, procedures or requirements applicable to the Work or services rendered under this Contract shall be those of the Contractor, not the County.

GR-12. SUBCONTRACTING

A. The Contractor understands and agrees that it shall be a breach of this Contract to subcontract any portion of the Work on this Project unless

1. The Work and the Subcontractor proposed to perform it have been declared in the Bid to the Contract; or

2. The Contractor shall have obtained advance written approval from the County.

B. The Contractor further understands and agrees that any work on this Project, which the Contractor secures in violation of this General Requirement, shall be deemed a donation from the Contractor for which the County shall not be

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obligated to pay. Nothing contained in this Contract shall create any contractual relation between any Subcontractor and the County. Upon request, Contractor shall provide the County with copies of each of its contract(s) and amendments with each Subcontractor.

C. Nothing contained in this Contract shall create, nor be interpreted to create privity, or any other relationship whatsoever, between the County and any person, or entity or than Contractor.

GR-13. ASSIGNMENTS

The Contractor agrees it shall not sublet, assign, transfer, pledge, convey, sell, or otherwise dispose of the whole or any part of this Contract or his right, title, or interest therein to any person, firm, or corporation without the previous written consent of the County. If the County consents to any such assignment or transfer, then the Contractor binds itself, its partners, successors and assigns to all covenants of this Contract.

GR-14. INDEMNIFICATION AND HOLD HARMLESS

A. The Contractor shall be responsible from the execution date or from the time of the beginning of the Work, whichever shall be the earlier, for all injury or damage of any kind resulting from the Work, to persons or property, including employees and property of the County. The Contractor shall exonerate, indemnify, and save harmless the County, its elected officials, officers, employees, agents and servants, hereinafter collectively referred to in this General Requirement as "the County Indemnitees," from and against all claims or actions based upon or arising out of any damage or injury (including without limitation any injury or death to persons and any damage to property) caused by or sustained in connection with the performance of this Contract or by conditions created thereby or arising out of or any way connected with Work performed under this Contract, as well as all expenses incidental to the defense of any such claims, litigation, and actions. Furthermore, Contractor shall assume and pay for, without cost to the County Indemnitees, the defense of any and all claims, litigation, and actions suffered through any act or omission of the Contractor, or any Subcontractor, or anyone directly or indirectly employed by or under the supervision of any of them. Notwithstanding any language or provision in this Contract, Contractor shall not be required to indemnify any County Indemnitee against claims, actions, or expenses based upon or arising out of the County Indemnitee's sole negligence.

B. As between the County Indemnitees and the Contractor as the other party, the Contractor shall assume responsibility and liability for any damage, loss, or injury, including death, of any kind or nature whatever to person or property, resulting from any kind of claim made by Contractor's employees, agents, vendors, Suppliers or Subcontractors caused by or resulting from the performance of Work under this Contract, or caused by or resulting from any error, omission, or the negligent or intentional act of the Contractor, vendors, Suppliers, or

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Subcontractors, or any of their officers, agents, servants, or employees. The Contractor shall defend, indemnify, and hold harmless the County Indemnitees from and against any and all claims, loss, damage, charge, or expense to which they or any of them may be put or subjected by reason of any such damage, loss, or injury.

C. The Contractor expressly agrees to provide a full and complete defense against any claims brought or actions filed against the County Indemnitees, where such claim or action involves, in whole or in part, the subject of the indemnity contained in this Contract, whether such claims or actions are rightfully or wrongfully brought or filed. The County has the sole discretion to choose the counsel who will provide the defense.

D. No provision of this Contract and nothing herein shall be construed as creating any individual or personal liability on the part of any elected official, officer, employee, agent or servant of the County, nor shall the Contract be construed as giving any rights or benefits hereunder to anyone other than the parties to this Contract.

E. The parties agree that Contractor shall be liable for all fines or civil penalties, which may be imposed by any local, federal or state department or regulatory agency that are a result of Contractor's performance of the Work under this Contract. Contractor shall pay the costs of contesting any such fines. The parties' obligations pursuant to this General Requirement shall survive any acceptance of Work, or termination or expiration of this Contract.

GR-15. ROYALTIES AND PATENTS

The Contractor shall hold and save the County and its elected officials, officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the County, unless otherwise specifically stipulated in the Contract.

GR-16. LAWS AND REGULATIONS

A. The Contractor's attention is directed to the fact that all applicable federal, state, and County laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full. The Contractor shall keep itself and its employees and Subcontractors fully informed of all laws, ordinances, and regulations in any manner affecting those engaged or employed in the Work or the materials used in the Work or in any way affecting the conduct of the Work and of all orders and decrees of bodies or tribunals having any jurisdiction or

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authority over same. If Contractor discovers any discrepancy or inconsistency in this Contract or in the Drawings or Specifications in relation to any such law, regulation, ordinance, order, or decree, Contractor shall promptly report the same, in writing, to the County. Contractor shall at all times observe and comply with all such laws, ordinances, and regulations, and shall protect and indemnify the County and its agents against any all damages and claims arising out of any violation of such law, ordinance, regulation, order, or decree, whether by Contractor or its employees or Subcontractors.

B. Contractor shall not discriminate against any person in its operations, activities or performance of Work under this Contract. Contractor shall affirmatively comply with all applicable provisions of federal, state and local equal employment laws and shall not engage in or commit any discriminatory practice against any person based on race, age, religion, color, gender, national origin, physical or mental disability, or political affiliation. Contractor shall maintain a Drug Free Workplace.

GR-17. PERMITS AND INSPECTION FEES

A. Permits shall be secured by the Contractor, and inspections will be required, but the County will not charge the Contractor for permits and inspections obtained from the County. The Contractor shall secure and pay for any permits and inspection fees required by any other governmental entity or agency.

B. Prior to execution of this Contract, Contractor shall provide the County with a copy of its current, valid business license. If Contractor is not a Georgia corporation, Contractor shall submit a certificate of authority to transact business in the state of Georgia and a copy of their valid business license issued by their home jurisdiction. Contractor shall provide the County with copies of all other required licenses, certifications and permits for the Contractor and/or all of Contractor's employees, personnel, agents or Subcontractors performing services that require licensure by the federal government, the State of Georgia, or the County. Contractor hereby warrants and represents that at all times during the Contract Term it shall maintain in good standing all required licenses, certifications, and permits required under federal, state and local laws necessary to perform the services required by this Contract.

GR-18. LAND AND RIGHTS-OF-WAY

Prior to entering on any land or right-of-way, the Contractor shall ascertain the requirements of applicable permits or easements obtained by the County, and shall conduct his work in accordance with requirements thereof, including the giving of notice. The Contractor shall be fully responsible for performing work to the requirements of any permit or easement granting entity, even though such requirements may exceed or be more stringent than that

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otherwise required by the Contract, and shall compensate the County fully for any loss or expense arising from failure of the Contractor to perform as required by such entity. The Contractor shall provide, at its own expense without liability to the County, any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.

GR-19. PROTECTION OF WORK, PROPERTY, AND PERSONS

A. The Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Project and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, lakes, drainage ways, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

B. The Contractor shall erect and maintain, as required by the conditions and progress of the Work, all necessary warning safeguards for devices and the safety and protection of the Work, the public and adjoining property.

C. If existing utilities or structures are indicated by the Contract, no warranty is made as to the accuracy or completeness of such indication or the information provided regarding such utilities or structures. The Contractor shall comply with all applicable state law concerning the marking and location of existing utilities. The Contractor shall, prior to commencing other on-site work, accurately locate above and below ground utilities and structures, which may be affected by the Work, using whatever means may be appropriate, and shall verify the nature and condition of such utilities and structures. The Contractor shall mark the location of existing utilities and structures, if they are not otherwise readily visible, with flagging, stakes, barricades, or other suitable means, and shall preserve and protect all utilities and structures not designated for removal, relocation, or replacement in the course of construction. Contractor shall notify the County promptly of discovery of any conflict between the Contract and any existing facility.

D. All existing utilities, both public and private, including but not limited to, sewer, gas, water, electrical, and telephone services, shall be protected and their operation shall be maintained through the course of the Work. Any temporary shutdown of an existing service shall be arranged between the Contractor and the responsible agency. The Contractor shall assume full responsibility and hold the County harmless from the result of any damage that may occur as a result of the Contractor's activities in this regard.

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E. In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, or unanticipated conditions where delay would substantially impact the time or cost of work, the Contractor, upon notification to the County, shall act to prevent threatened damage, injury, or loss. Any claim for compensation or extension of time by the Contractor due to such extra work shall be submitted to the County within ten (10) days of the date of performing such work or deviations in the manner prescribed for a Change Order.

GR-20. PROHIBITED INTERESTS

No official of the County who is authorized in such capacity and on behalf of the County to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract, or any subcontract in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part hereof. No officer, employee, architect, attorney, engineer, or inspector of or for the County who is authorized in such capacity and on behalf of the County to exercise any legislative, executive, supervisory, or other similar functions in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.

GR-21. FIRST SOURCE JOBS ORDINANCE

The Contractor is required to comply with the DeKalb County First Source Jobs Ordinance, Code of DeKalb County as Revised 1988, section 2-231 *et seq*., and among other things, is required to make a good faith effort to hire DeKalb County residents for at least fifty percent 50% of all jobs created by an Eligible Project, as that term is defined in the First Source Ordinance, using the First Source Registry.

GR-22. FOREIGN CORPORATIONS

In the event the Contractor is a foreign corporation, partnership, or sole proprietorship, the Contractor hereby irrevocably appoints the Georgia Secretary of State as its agent for service of all legal process for the purposes of this Contract only.

GR-23. SPECIFICATIONS AND DRAWINGS

A. The Specifications, the Drawings and the Contract shall be supplementary to each other, and any material, workmanship, and/or service which may be in one, but not called for in the others, shall be as binding as if indicated, called for, or implied by all.

SAMPLE

B. Each section or type of work is described separately in the Technical Specifications; however, should any item of material, equipment, work, or combinations of such be required in one section, and not be described in that section and a similar item described in another section, that description shall apply regardless of the section under which it is described.

C. Any discrepancies found between the Drawings and Specifications and site conditions, or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the County, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the Contractor's risk.

D. Upon award of the Contract, the Contractor will be supplied, free of charge, up to three complete sets of the Contract Drawings and Specifications. Any prints and Specifications in excess of these shall be furnished at cost at the Contractor's expense.

E. The Contractor shall furnish, with reasonable promptness, all samples as directed by the County for approval for conformance with the design concept of the Project and for compliance with the information stated in the Contract. The Work shall be in accordance with approved samples.

F. The County may, without changing the scope of the Work, furnish the Contractor additional instructions and detail drawings, as necessary to carry out the Work required by the Contract. The additional drawings and instructions thus supplied will become a part of the Contract. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

G. Attention is directed to the fact that the detailed Specifications and separate sections may be written in short or abridged form. In regard to every section of the Specifications and all parts thereof, mentioned therein, or indications on the Drawings of articles, materials, operations, or methods, requires that the Contractor:

(1) Provide each item mentioned and indicated of a quality or subject to qualifications noted;

(2). Perform according to conditions stated, each operation prescribed; and

(3) Provide therefore all necessary labor, equipment, and incidentals.

H. For convenience of reference and to facilitate the letting of contracts and subcontracts, these Specifications are separated into titled sections. Such separation shall not, however, operate to make the County an arbiter to establish limits for the contracts between the Contractor and Subcontractors.

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I. Notwithstanding the appearance of such language in the various sections of the Specifications as, "The Paving Contractor," "The Grading Contractor," etc., the Contractor is responsible to the County for the entire Contract and the execution of all Work referred to in the Contract.

GR-24. CONTRACTOR'S SUBMITTALS

A. The Contractor shall submit all Submittals to the official or employee so designated by the chief executive officer all Submittals as required under the Specifications and in such time and manner that will allow at least ten (10) days for the County's review, pursuant to the Construction Schedule. No portion of the Work shall commence until all Submittals relating to such portion have been approved by the County.

B. The approved Drawings will be supplemented by such shop drawings as are needed to adequately control the Work. Shop Drawings, product data, samples and other Submittals are not parts of the Contract. The purpose of their submittal is to demonstrate for those portions of the Work for which Submittals are required by the Contract, the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract. Informational Submittals, upon which a County employee, the Architect or Engineer, if retained by the County in connection with the Project, is not expected to take responsive action, may be so identified in the Contract. Submittals which are not required by the Contract may be returned by the County without action. The approval of a Submittal shall not authorize any deviation from or alteration of the Drawings or Specifications absent a Change Order or Field Order.

C. Shop drawings to be furnished by the Contractor for any structure shall consist of such detailed drawings as may be required for the execution of the Work.

D. Drawings for false work, centering, and form work may also be required per the Specifications and in such cases shall be likewise subjected to approval unless approval is waived.

E. The County's review will be within reasonable promptness as to cause no delay in the Work. Approval of the Contractor's Submittals does not relieve the Contractor of any responsibility for accuracy of dimensions and details or from otherwise ensuring that the Work complies with the requirements of the Contract. It is mutually agreed that the Contractor shall be responsible for agreement and conformity of Submittals with the Drawings and Specifications. The County will review and approve or take other appropriate action upon the Contractor's Submittals such as shop drawings, product data and samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract. Review of submittals is not conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions for installation or

SAMPLE

performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract. The County's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences or procedures. The County's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

D. It is the responsibility of the Contractor to check all Submittals before same are submitted to the County for approval. Submittals which have not been checked and approved by the Contractor will not be reviewed by the County.

E. Submittals shall be submitted only by the Contractor who shall indicate by a signed stamp on the drawings that he has checked the Submittals and that the work shown on them is in accordance with Contract requirements and has been checked for dimensions and relationship with work of all other trades involved. Under no conditions shall Submittals be accepted from anyone other than the Contractor.

F. The Contractor shall furnish the County with at least six copies of all Submittals for approval. Two finally approved copies will be returned to the Contractor for his use. The Contract Price shall include the cost of furnishing all Submittals and the Contractor will be allowed no extra compensation for such drawings.

G. The approval of such Submittals shall not relieve the Contractor from responsibility for deviations from Drawings or the Specifications unless he has in writing called attention to such deviations, and the County has approved the changes or deviations in writing at the time of submission, nor shall it relieve him from the responsibility for errors of any kind in Submittals. When the Contractor does call such deviations to the attention of the County, he shall state in writing whether or not such deviations involve any extra cost. If this is not mentioned, it will be assumed that no extra cost is involved for making the change.

H. The Contractor shall prepare and maintain a log of all Submittals which includes, at a minimum, the submittal number, revision number, description, responsible company, proposed submittal date, date actually submitted, date approved, any comments received, approval status, and resubmittal information. The log shall be updated at least on a monthly basis and made available to the County for review upon request.

GR-25. AS-BUILT DRAWINGS

The Contractor shall maintain a red-lined set of drawings on site during the progress of the Work, indicating any Field Orders, Change Orders and the location of the portion of the Work or equipment actually installed. The Contractor shall, upon completion of the Work, furnish a marked set of reproducible drawings indicating any field changes and the location of Work as actually installed, if different from the requirements of the Contract, and deliver them to

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the County in hard copy as well as an electronic copy compatible with the County's software and hardware system.

GR-26. EXAMINATION OF WORK BY CONTRACTOR

It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the Work, the configuration of the ground, the character, quality, and quantity of the facilities needed preliminary to and during the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

GR-27. INSPECTION AND TESTING OF MATERIALS

Unless otherwise specifically provided for, the inspection and testing of materials and finished articles to be incorporated in the Work as required by the Specifications shall be made by the County, or bureaus, laboratories, or agencies selected by the County. The cost of such inspection and testing shall be paid by the Contractor unless County agrees to pay the cost. Materials and finished articles shall have passed the required tests prior to the incorporation of such materials and finished articles in the Work. The County may require, and the Contractor shall furnish if required to do so, certificates from manufacturers to the effect that the products or materials furnished by them for use in the Work comply with the applicable specified requirements for the materials or products being furnished.

GR-28. INSPECTION OF WORK

A. The Contractor shall, at all times, permit and facilitate inspection of the Work by authorized representatives of the County and public authorities having jurisdiction in connection with the Work of this Contract. The presence or observations of the County or its representative at the site of the Work shall not be construed to, in any manner, to relieve the Contractor of its responsibility for strict compliance with the provisions of the Contract.

B. If the Drawings, Specifications, County's instructions, laws, ordinances, or a public authority require any work to be specially tested or approved, the Contractor shall give the County timely notice of its readiness for observation or inspection. If the inspection is by another authority, then the County shall be advised of the date fixed for such inspection. Required certificates of inspection shall be secured by the Contractor. Contractor, having secured all certificates of inspection, will deliver same to the County upon completion. If any Work should be covered up without approval or consent of the County, it shall, if required by the County, be uncovered for examination at the Contractor's expense. The recovering of such Work after inspection shall be at Contractor's expense.

C. Should any disagreement or difference arise as to the estimate, quantities, or classifications or as to the meaning of the Drawings or Specifications, or any point concerning the character, acceptability, and nature of the several kinds of

SAMPLE

work, any materials and construction thereof, the decisions of the County shall be final and conclusive and binding upon all parties to the Contract.

D. If the County determines that portions of the Work require additional testing, inspection or approval beyond the requirements of the Specifications, the County will instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the County, and the Contractor shall give timely notice to the County of when and where tests and inspections are to be made so that the County may be present for such procedures. Such costs, except as provided below, shall be at the County's expense.

E. If such procedures for testing or inspection reveal failure of the portions of the Work to comply with requirements established by the Contract, all costs made necessary by such failure including those of repeated procedures shall be at the Contractor's expense.

F. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract, be secured by the Contractor and promptly delivered to the County or the Architect if one is retained by the County in connection with the Project. Tests or inspections conducted, pursuant to the Contract, shall be made promptly to avoid unreasonable delay in the Work.

GR-29. REQUESTS FOR SUBSTITUTIONS

A. Requests for substitutions of proprietary products or of a particular manufacturer, vendor, or Subcontractor must be accompanied by the following documentation:

(1) Full explanation of the proposed substitution and submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution;

(2) Reasons the substitution is advantageous or necessary, including benefits to the County and the Work in the event the substitution is acceptable;

(3) The adjustment, if any, in the Contract Price, in the event the substitution is acceptable;

(4) The adjustment, if any, in the Contract Term or Time and the construction schedule in the event the substitution is acceptable;

(5) An affidavit stating that (1) the proposed substitution conforms and meets all the requirements of the pertinent Specifications and the requirements shown on the Drawings and (2) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified;

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(6) Proposals for substitutions must be submitted in triplicate to the County in sufficient time to allow the County no less than ten (10) working days for review; and

(7) No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

B. Substitutions and alternates may be rejected at the County's discretion without explanation and will be considered only under one or more of the following conditions:

(1) Required for compliance with interpretation of code requirements or insurance regulations then existing;

(2) Unavailability of specified products, through no fault of the Contractor; or

(3) Subsequent information discloses inability or specified products to perform properly or to fit in designated space;

(4) Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required; and

(5) When in judgment of the County, that a substitution would be substantially to the County's best interests, in terms of costs, time, or other considerations.

C. Whether or not any proposed substitution is accepted by the County, the Contractor must reimburse the County for any fees charged by the Architect or other consultants for evaluating each proposed substitute. By making requests for substitutions based on the above, the Contractor:

(1) Represents and warrants that the Contractor has personally investigated the proposed substitute product or Subcontractor and determined that it is equal or superior in all respects to the product or Subcontractor previously specified;

(2) Represents and warrants that the Contractor will provide the same warranty for the substituted product or for the workmanship of the substituted Subcontractor, as applicable, that the Contractor would have provided for the product or Subcontractor previously specified;

(3) Certifies that the cost data presented, in the form of certified quotations from Suppliers of both specified and proposed equipment is complete and includes all related costs under this Contract, but excludes costs under

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separate contracts, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

(4) Agrees that the Contractor will coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete and in accordance with the Contract in all respects.

D. Contractor shall not propose an item for substitution unless it is equal to or superior to the specified item or items in construction, efficiency, and utility. The opinion of the County as to the equality or superiority of the item shall be final, and no substitute material or article shall be purchased or installed without the County's written approval.

E. In case of a difference in price, the County shall receive all benefits of the difference in cost involved in any substitution, when lower, and the Contract altered by Change Order to credit the County with any savings to be obtained. However, the County shall not be charged for any additional cost in the case of a price increase.

GR-30. REJECTIONS OF WORK AND MATERIALS

A. All Work that is defective or deviates from the Drawings or Specifications will be rejected. All rejected Work shall be replaced immediately with other material, equipment, or work which conforms with the Drawings and Specifications at no additional cost to the County. If rejected Work is not removed within forty-eight hours from the date of letter of notification, the County shall have the right and authority to stop the Work immediately and/or to arrange for the removal of said rejected Work at the cost and expense of the Contractor.

B. Inspection of the Work shall not relieve the Contractor of any of its obligations, and defective Work shall be made good regardless of whether it has been previously inspected by the County and accepted or estimated for payment. The failure of the County to reject or condemn improper materials or workmanship shall not be considered as a waiver of any defect that may be discovered later.

GR-31. MATERIALS, SERVICES, AND FACILITIES

A. The Contractor shall at all times employ sufficient labor and equipment for executing the Work to full completion in the manner and time specified. Failure of the Contractor to provide adequate labor and equipment shall constitute a default of the Contract. The labor and equipment to be used in the Work by the Contractor shall be sufficient to meet the requirements of the Work and shall be such as to produce a satisfactory quality of work in accordance with accepted industry practices and within the Contract Time.

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B. Materials and equipment shall be so stored and handled as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection. No product which has in any way become unfit for the intended purpose shall be incorporated into the Work.

C. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, cleaned, and conditioned as directed by the manufacturer. Contractor shall promptly notify the County of any conflict between the instructions of any manufacturer and the requirements of the Drawings or the Specifications.

D. Materials, supplies, and equipment to be incorporated into the Work shall be new and unused unless otherwise specifically stated in the Contract. The source of supply for all such products shall be submitted to the County, together with detailed descriptions thereof in the form of samples, shop drawings, tests, or other means necessary to adequately describe the items proposed. Approval by the County of a manufacturer or supplier shall not constitute the approval of materials, supplies, or equipment obtained from such manufacturer or supplier if they do not comply with the requirements of the Contract. If, after trial or installation, it is found that sources of supply, even though previously approved by the County, have not furnished products meeting the intent of the Contract, the Contractor shall thereafter furnish products from other approved sources, and shall remove completed Work incorporating products which do not meet Contract requirements.

E. The Contractor shall confine operations to areas permitted by law, ordinances, permits and the Contract, and shall not unreasonably encumber the site with materials or equipment. The Contractor shall provide parking for all construction vehicles only within the construction limits as indicated on the drawings or make appropriate arrangements as permitted by law.

F. Only materials and equipment which are to be used directly in the Work may be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it must be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is the sole responsibility of the Contractor.

G. The Contractor and any entity for which the Contractor is responsible must not erect any sign on the Project site without the prior written consent of the County, which may be withheld in the sole discretion of the County.

H. Contractor must ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, and for emergency response to the site of the Work and all adjacent areas. The Work must be

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performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work are free from debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract, Contractor must use its best efforts to minimize any interference with the occupancy or beneficial use of any areas and buildings adjacent to the site of the Work, or the Project.

I. Without prior approval of the County, the Contractor shall not permit any worker to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the County for such use. Without limitation of any other provision of the Contract, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the County in connection with the use and occupancy of the Project site, as amended from time to time. The Contractor shall immediately notify the County in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems that may be caused by such compliance and suggesting alternatives through which the results intended by such portions of the rules and regulations can be achieved. The County may, in the County's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations. The Contractor shall also comply with all insurance requirements applicable to the use and occupancy of the Project site.

J. Unless otherwise provided in the Contract, Contractor shall provide and maintain a suitable office on the site for its own use and for the use of representatives of the County. Contractor shall furnish sufficient heat, artificial light, ventilation and janitor's service, and shall also provide a table or desk, plan rack and chairs, all for the use of those visiting the job, in addition to such furnishings as he provides for his own use. Temporary offices and other structures shall be located where approved by the County, and shall be removed from the premises upon completion of the Contract or earlier if so directed by the County.

K. Contractor may be required by the County, at the beginning of Work, to provide, at the Project site, suitable and adequate temporary toilets and enclosure for use of workers on the job, shall maintain same in sanitary condition, and shall remove same at the completion of construction operations and/or when directed by the County. Contractor shall not allow any sanitary nuisances to be committed in or about the site and shall enforce sanitary regulations of local and state health authorities.

L. The Contractor shall cooperate with the County in any required use of the property and arrange for storage of materials on the Project site in such areas as are mutually agreed upon. The Contractor shall allot suitable and proper space to its Subcontractors for the storing of their materials and for the erection of their sheds and tool houses. Should it be necessary at any time to move materials,

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sheds, or storage platforms, the Contractor shall, at its own expense move same as and when directed by the County.

M. Unless otherwise instructed by the County, the Contractor shall repair and return to original condition all buildings, streets, curbs, sidewalks, utilities or other facilities affected by the Contractor's performance of the Work. The County's decisions in matters relating to aesthetic effect shall be final if consistent with the intent of the Contract.

GR-32. UTILITIES DURING CONSTRUCTION

Contractor shall furnish all utilities and pay for all bills for utilities used during construction. Utilities shall include electric power, fuel of any sort used for heating, etc., telephone services, cable and internet, if necessary, and water. Contractor shall provide all temporary connections to utilities when not provided by the utility company or others at no additional cost to the County. Contractor shall, if required by the County, install and maintain at his own expense, a job telephone and communications equipment necessary for the execution of the Work for the Contract Time.

GR-33. TEMPORARY HEAT AND AIR CONDITIONING

The Contractor shall provide, at his own expense, temporary heat or air conditioning, as necessary, to protect all Work and materials against injury from heat, dampness or cold. Fuel, equipment and method of heating and cooling shall be satisfactory to the County and shall not present a fire hazard. Contractor shall comply with the requirements in the Specifications for specific temperatures to be maintained.

GR-34. MAINTENANCE MANUAL

Contractor shall, prior to completion of Contract, deliver to the County two (2) copies of a manual, assembled, indexed, and bound, for the County's guidance, full details for care and maintenance of visible surfaces and of equipment included in Contract. Contractor shall, for this manual, obtain from Subcontractors literature of manufacturers relating to equipment, including motors; also furnish cuts, wiring diagrams, instruction sheets and other information pertaining to same that will be useful to the County in over-all operation and maintenance. Where the above-described manuals and data are called for under separate sections of the Specifications, they are to be included in the manual described in this General Requirement.

GR-35. WEATHER CONDITIONS

The Contractor will be required to protect all work and materials against damage or injury from the weather. If, in the opinion of the County, any work or materials shall have been damaged or injured by reason of failure to protect such, all such materials or work shall be removed and replaced at the expense of the Contractor.

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GR-36. LINES, GRADES, AND MEASUREMENTS

A. Such stakes and markings as the County may set for either its or the Contractor's guidance shall be preserved by the Contractor. Failure to protect such stakes or markings may, at the County's discretion, shall result in the Contractor being charged for their replacement.

B. The Contractor must exercise proper care and caution to verify the grades and figures furnished by or on behalf of the County before proceeding with the Work, and shall be responsible for any damage or defective work caused by its failure to exercise such care and caution. Contractor shall promptly notify the County of any errors or discrepancies it may discover in order that the proper corrections may be made.

C. Before ordering materials or doing work, the Contractor shall measure and verify the dimensions and locations of all existing structures, substrata, and features that affect the Work and shall be responsible for the correctness of same. No consideration will be given any claim based on the differences between the actual dimensions and those indicated on the Drawings. Contractor shall promptly notify the County of any difference which may be found, and shall obtain direction from the County before proceeding with the affected Work.

GR-37. CLEANING UP

A. The Contractor shall at all times, keep the premises free from accumulation of waste materials or rubbish caused by Contractor's employees or work. Upon completion of the Work, the Contractor shall remove all his plants, tools, materials, and other articles from the property of the County.

B. If the Contractor fails to clean up, as provided in the Contract, the County may do so, and the cost thereof shall be charged to the Contractor. Contractor shall ensure that neither it, its Subcontractors, nor their employees or agents bring any hazardous materials or other materials/waste regulated by state, federal or local law, which are not commonly used in the construction process or which are not listed in any Specifications for the Project onto the Project site without first obtaining the County's advance written approval. Contractor agrees to ensure that any hazardous materials/waste or other materials/waste regulated by state, federal or local law that Contractor, its Subcontractors or their employees or agents, bring onto or generate at the Project Site are handled in accordance with all applicable laws.

C. The Contractor shall pay all required material disposal fees and shall dispose of all materials in accordance with all applicable laws and regulations. The Contractor shall be responsible for all costs associated with improper disposal of materials, including any clean-up costs, fines or penalties, whether levied against the Contractor or the County.

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D. In addition to removing rubbish on a periodic basis and leaving the building broom clean, the Contractor shall clean all tile and glass; replace broken glass; remove stains, paint spots, and dirt from all Work; clean and polish all plumbing fixtures and equipment; and remove all temporary protection items. To the maximum extent reasonably possible, the Contractor shall keep the interior of the building free of combustible materials as the Work progresses.

E. The Contractor shall maintain and keep clean at all times the immediate approach to the Project site, including the roads abutting the Project site.

GR-38. BARRICADES

A. Contractor shall provide barricades and protective barriers around excavations, so that the public is adequately warned of such hazards. Lanterns shall remain lighted from sundown to sunrise and at all other times when the labor forces are not on the job site.

B. Delivery of construction materials and equipment shall be only to locations approved by the County.

GR-39. NO THIRD-PARTY BENEFICIARY

Except as expressly and specifically set forth herein, this Contract shall not be deemed to provide any third-party with any remedy, claim, right of action, or other right.

GR-40. SEVERABILITY

If any provision of this Contract or the application thereof to any person or circumstance shall to any extent be held invalid, then the remainder of this Contract or the application of such provision to persons or circumstances, other than those as to which it is held invalid, shall not be affected thereby, and each provision of this Contract shall be valid and enforced to the fullest extent permitted by law.

GR-41. INTERPRETATION

The laws of the State of Georgia shall govern the construction of this Contract without regard for conflicts of laws. Should any provision of this Contract require judicial interpretation, it is agreed that the court interpreting or construing the same shall not apply a presumption that the terms hereof shall be more strictly construed against one party, by reason of the rule of construction, that a document is to be construed more strictly against the party who itself or through its agent prepared same; it being agreed that the agents of all parties have participated in the preparation hereof, and all parties have had an adequate opportunity to consult with legal counsel. In interpreting this Contract in its entirety, the printed provisions of this Contract, and any additions written or typed hereon, shall be given equal weight, and there shall be no

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inference by operation of law or otherwise; that any provision of this Contract shall be construed against either party hereto.

GR-42. PRIOR CONTRACTS; CONFLICT IN DOCUMENTS

The Contractor may in no case claim a waiver of any specification requirements on the basis of previous approval of material or workmanship on other jobs of like nature or on the basis of what might be considered "standard" for material or workmanship in any particular location. The Contract for this Project shall govern the Work. If any portion of the Contract shall be in conflict with any other portion, the various documents comprising the Contract shall govern in the following order of precedence: Contract, Change Orders or modifications issued after execution of the Contract; the General Requirements of the Contract; the Specifications; the Drawings, as between schedules and information given on the Drawings, the schedules shall govern; as between figures given on Drawings and the scaled measurements, the figures shall govern; as between large-scale Drawings and small-scale Drawings, the larger scale shall govern; and detailed Drawings shall govern over general Drawings; and the Bid Document Package.

GR-43. ENTIRE AGREEMENT

This Contract constitutes the sole contract between the County and the Contractor. The terms, conditions, and requirements of this Contract may not be modified, except by Change Order or Field Order. No verbal agreement or conversation with any officer, agent, or employee of the County, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations herein contained. No representations, oral or written, shall be binding on the parties unless expressly incorporated herein. No Change Order or Field Order shall be enforceable unless approved by official action of the County as provided by law or in this Contract.

GR-44. COUNTERPARTS

This Contract may be executed in several counterparts, each of which shall be deemed an original, and all such counterparts together shall constitute one and the same Contract.

GR-45. VENUE

The courts of DeKalb County, Georgia shall have exclusive jurisdiction to try disputes arising under or by virtue of this Contract.

GR-46. RIGHT TO AUDIT

The County shall have the right to audit all books and records, including electronic records, relating or pertaining to this contract or agreement, including but not limited to all financial and performance related records, property, and equipment purchased in whole or in part with County funds and any documents or materials which support those records, kept under the control of the Contractor, including but not limited to those kept by the Contractor's employees, agents, assigns, successors and subcontractors. The County also has the right to communicate

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with Contractor's employees related to the audited records.

The Contractor shall maintain such books and records, together with such supporting or underlying documents and materials, for the duration of this contract and for seven (7) years after termination or expiration, including any and all renewals thereof. The books and records, together with supporting documents and materials shall be made available, upon request to the County or its designee, during normal business hours at the Contractor's office or place of business. In the event that no such location is available, then the books, records, and supporting documents shall be made available for audit at a time and location which is convenient for the County.

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ATTACHMENT B

Contractor Affidavit under O.C.G.A. §13-10-91

By executing this affidavit, the undersigned Contractor verifies its compliance with O.C.G.A. §13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of DEKALB COUNTY has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. §13-10-91. Furthermore, the undersigned Contractor will continue to use the federal work authorization program throughout the Contract Term and the undersigned Contractor will contract for the physical performance of services in satisfaction of such contract only with Subcontractors who present an affidavit to the Contractor with the information required by O.C.G.A. §13-10-91. Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Contractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, 20__ in _____(city), _____(state).

By:_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

Subscribed and Sworn before m on this the
_____ day of _____, 20 ___.

_____
NOTARY PUBLIC
My Commission Expires:
_____

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ATTACHMENT C

Subcontractor Affidavit under O.C.G.A. § 13-10-91

By executing this affidavit, the undersigned Subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with _____(insert name of Contractor) on behalf of DEKALB COUNTY, GEORGIA has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned Subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the Subcontractor with the information required by O.C.G.A. § 13-10-91. Additionally, the undersigned Subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the Contractor within five business days of receipt. If the undersigned Subcontractor receives notice that a sub-subcontractor has received an affidavit from any other contracted sub-subcontractor, the undersigned Subcontractor must forward, within five business days of receipt, a copy of the notice to the Contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____ ___, 20__ in _____(city), _____(state).

By:_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

Subscribed and Sworn before me on this the
_____ day of _____, 20 ___.

_____
NOTARY PUBLIC
My Commission Expires:

SAMPLE

ATTACHMENT D

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for _____(name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract) and _____(name of Contractor) on behalf of DEKALB COUNTY, GEORGIA has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to _____(name of Subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to _____(name of Subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

_____
Federal Work Authorization User Identification Number

_____
Date of Authorization

_____
Name of Sub-subcontractor

_____
Name of Project

_____
Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____ ___, 20__ in _____(city), _____(state).
By:_____
Signature of Authorized Officer or Agent

_____
Printed Name and Title of Authorized Officer or Agent

Subscribed and Sworn before me on this the
_____ day of _____, 20 ___.

_____
NOTARY PUBLIC
My Commission Expires:_____

SAMPLE

ATTACHMENT E

DEKALB COUNTY, GEORGIA
CERTIFICATE OF CORPORATE AUTHORITY
(Choose Applicable Certificate)

I, _____, certify that I am Secretary of the corporation named as Contractor herein, same being organized and incorporated to do business under the laws of the State of _____; that _____, who executed this Contract on behalf of the Contractor was, then and there, _____; and that said Contract was duly signed by said officer for and in behalf of said corporation, pursuant to the authority of its governing body and within the scope of its corporate powers.

I further certify that the names and addresses of the owners of all the outstanding stock of said corporation as of this date are as follows:

_____

_____

_____

_____

_____

_____

This _____ day of _____, 20____.

_____ (Corporate Seal)
Secretary

SAMPLE

ATTACHMENT E

DEKALB COUNTY, GEORGIA
CERTIFICATE OF AUTHORITY – JOINT VENTURE
(Separate Certificate to be submitted by each joint venture partner)

I, _____,[1] certify that

1. I am the _____[2] of _____,[3] (hereinafter "Venturer");

2. Venturer is a partner and participant in the joint venture named as Contractor in that certain Contract for Construction dated _____ with DeKalb County, issued pursuant to Invitation to Bid or Request for Proposal No. _____;

3. Venturer is organized and incorporated to do business under the laws of the State of _____;

4. _____, who executed this Contract on behalf of the Contractor was, then and there, _____; and

5. Said Contract was duly signed by said officer for and in behalf of said Venturer and the Contractor pursuant to the authority of the governing body of each and within the scope of its corporate powers.

6. I further certify that the names and addresses of the owners of all the outstanding stock or ownership interest in Venturer as of this date are as follows:

_____

_____

_____

This _____ day of _____, 20___.

_____

INSTRUCTIONS:

1. Name of secretary (if Venturer is a corporation), or Manager or CEO (if Venturer is a LLP) of Venturer.
2. Title of person executing Certification.
3. Name of joint venture partner.

MAKE COPIES OF THIS FORM AND SUBMIT A SEPARATE FORM FOR EACH JOINT VENTURE PARTNER.

SAMPLE

ATTACHMENT F
(Consisting of 3 pages)
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that _____ *[Insert name of contractor]* (hereinafter called the "Principal") and _____ *[Insert name of surety]* (hereinafter called the "Surety"), are held and firmly bound unto _____ County (hereinafter called the "County") and their successors and assigns, in the penal sum of _____ Dollars ($_____), lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the County, awarded by the DeKalb County Governing Authority on _____, which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for the _____ *[insert Name of the Project]*, more particularly described in the Contract (hereinafter called the "Project"); and

NOW, THEREFORE, the conditions of this obligation are as follows, that if the Principal shall fully and completely perform all the undertakings, covenants, terms, conditions, warranties, and guarantees contained in the Contract, including all change orders, modifications, amendments, changes, deletions, additions, and alterations thereto that may hereafter be made, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the County to be, in default under the Contract, the Surety shall promptly remedy the default as follows:

1. Complete the Contract in accordance with the terms and conditions; or
2. Obtain a Bid or Bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Surety and the County of the lowest responsible bidder, arrange for a contract between such bidder and County and make available as the work progresses (even though there should be a default or succession of defaults under the Contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the penal sum set forth in the first paragraph hereof, as may be adjusted, and the Surety shall make available and pay to the County the funds required by this Paragraph prior to the payment of the County of the balance of the contract price, or any portion thereof. The term "balance of the contract price," as used in this paragraph, shall mean the total amount payable by the County to the Contractor under the Contract, and any amendments thereto, less the amount paid by the County to the Contractor; or, at the option of the County; or

SAMPLE

3. Allow County to complete the work and reimburse the County for all reasonable costs incurred in completing the work.

In addition to performing as required in the above paragraphs, the Surety shall indemnify and hold harmless the County from any and all losses, liability and damages, claims, judgments, liens, costs, and fees of every description, including reasonable attorney's fees, litigation costs and expert witness fees, which the County may incur, sustain, or suffer by reason of the failure or default on the part of the Principal in the performance of any or all of the terms, provisions, and requirements of the Contract, including any and all amendments and modifications thereto, or incurred by the County in making good any such failure to performance on the part of the Principal.

The Surety shall commence performance of its obligations and undertakings under this Bond promptly and without delay, after written notice from the County to the Surety.

The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and any other amendments in or about the Contract, and agrees that the obligations undertaken by this bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alterations, extensions of time, change in payment terms, and amendments.

The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment to the Contract, so as to bind the Principal and Surety to the full and faithful performance of the Contract as so amended or modified, and so as to increase the penal sum to the adjusted Contract Price of the Contract.

The Surety's obligations under this bond include all of the Contractor's duties under the Contract, including without limitation its maintenance and guarantee obligations.

No right of action shall accrue on this bond to or for the use of any person, entity, or corporation other than the County and any other obligee named herein, or their executors, administrators, successors or assigns.

This Bond is intended to comply with O.C.G.A. §36-91-70, and shall be interpreted so as to comply with the minimum requirements thereof. However, in the event the express language of this Bond extends protection to the County beyond that contemplated by O.C.G.A. §36-91-70, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the County, whether or not such protection is found in the applicable statutes.

If any one or more of the provisions of this Bond are determined to be illegal or unenforceable by a court of competent jurisdiction, all other provisions shall remain effective.

IN WITNESS WHEREOF the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representatives this ____ day of _____, 20___.

SAMPLE

PRINCIPAL

By: _____(SEAL)
Signature of Principal

_____
Print Name and Title of Authorized Signer

_____
Print Name of Principal Business

ATTEST:

_____
Corporate Secretary

SURETY

By: _____(SEAL)
Signature of Surety (by Power of Attorney)

_____
Print Name and Title of Authorized Signer

_____
Print Name of Surety Business

WITNESS:

_____

[Attach Original Power of Attorney]

SAMPLE

ATTACHMENT G

(Consisting of 2 pages)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that _____ *[Insert name of contractor]* (hereinafter called the "Principal") and _____ *[Insert name of surety]* (hereinafter called the "Surety"), are held and firmly bound unto _____ County, (hereinafter called the "County"), its successors and assigns as obligee, in the penal sum of *[Insert contract amount]*, lawful money of the United States of America, for the payment of which the Principal and the Surety bind themselves, their administrators, executors, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered, or is about to enter, into a certain written contract with the County, awarded by the DeKalb County Governing Authority on _____[insert date of award] which is incorporated herein by reference in its entirety (hereinafter called the "Contract"), for the construction of a project known as *[insert name of project]*, as more particularly described in the Contract (hereinafter called the "Project");

NOW, THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payment to all persons working on or supplying labor or materials under the Contract, and any amendments thereto, with regard to labor or materials furnished and used in the Project, and with regard to labor or materials furnished but not so used, then this obligation shall be void; but otherwise it shall remain in full force and effect.

4. A "Claimant" shall be defined herein as any Subcontractor, person, party, partnership, corporation or other entity furnishing labor, services, or materials used, or reasonably required for use, in the performance of the Contract, without regard to whether such labor, services, or materials were sold, leased, or rented, and without regard to whether such Claimant is or is not in privity of contract with the Principal or any Subcontractor performing work on the Project, including, but not limited to, the following labor, services, or materials: water, gas, power, light, heat, oil, gasoline, telephone service, or rental of equipment directly applicable to the Contract.

5. In the event a Claimant files a claim against the County, or the property of the County, and the Principal fails or refuses to satisfy or discharge it promptly, the Surety shall satisfy or discharge the claim promptly upon written notice from the County, either by bond or as otherwise provided in the Contract.

6. The Surety hereby waives notice of any and all modifications, omissions, additions, changes, alterations, extensions of time, changes in payment terms, and any other amendments in or about the Contract and agrees that the obligations undertaken by this bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, alternations, extensions of time, changes in payment terms, and amendments.

7. The Surety hereby agrees that this Bond shall be deemed amended automatically and immediately, without formal or separate amendments hereto, upon any amendment or modification to the Contract, so as to bind the Principal and Surety, jointly and severally, to the full payment of any Claimant under the Contract, as amended or modified, provided only that the Surety shall not be liable for more than the penal sum of the Bond, as specified in the first paragraph hereof.

SAMPLE

8. This Bond is made for the use and benefit of all persons, firms, and corporations who or which may furnish any materials or perform any labor for or on account of the construction to be performed or supplied under the Contract, and any amendments thereto, and they and each of them may sue hereon.

9. No action may be maintained on this Bond after one (1) year from the date the last services, labor, or materials were provided under the Contract by the Claimant prosecuting said action.

10. This Bond is intended to comply with O.C.G.A. §36-91-90, and shall be interpreted so as to comply with the minimum requirements thereof. However, in the event the express language of this Bond extends protection to the County beyond that contemplated by O.C.G.A. §36-91-90, or any other statutory law applicable to this Project, then the additional protection shall be enforced in favor of the County, whether or not such protection is found in the applicable statutes.

IN WITNESS WHEREOF, the Principal and Surety have hereunto affixed their corporate seals and caused this obligation to be signed by their duly authorized representatives this ____ day of _____, 20___.

PRINCIPAL

By: _____(SEAL)
Signature of Principal

_____
Print Name and Title of Authorized Signer

_____
Print Name of Principal Business

ATTEST:

_____
Corporate Secretary

SURETY

By: _____(SEAL)
Signature of Surety (by Power of Attorney)

_____
Print Name and Title of Authorized Signer

_____
Print Name of Surety Business

WITNESS:

_____

[Attach Original Power of Attorney]

SAMPLE

TECHNICAL SPECIFICATIONS

OWNER:	DEKALB COUNTY GOVERNMENT
DEPARTMENT:	Facilities Management 1300 Commerce Drive, 3rd Floor Decatur, GA 30030 TEL: (404) 687-3552
PROJECT NAME:	LOU WALKER SENIOR CENTER CLASSROOM RENOVATION
PROJECT ADDRESS:	2538 PANOLA ROAD STONECREST, GEORGIA 30058

ITB# 19-101084

VOLUME I OF I

Jan 15, 2018

Architect: Coy L. Cooper

Brown Design Group, Inc.
3099 Washington Road
East Point, Georgia 30344
P: (404) 559-1805
Fax: (404) 761-0020
www.thebrowndesigngroup.com

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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 other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

1. Multiple Prime Contracts: Provisions of this Section apply to the work of each prime contractor.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" for requirements for the Contractor's Construction Schedule.
2. Division 1 Section "Applications for Payment" for administrative procedures governing Applications for Payment.
3. Division 1 Section "Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Within 10 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.

   a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
   d. When work is not performed by Contractors own forces, additionally, submit sub-contractors cost in the same format as indicated directly above.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

   1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
   2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
   3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   4. When work is not performed by Contractors own forces, additionally, submit sub-contractors cost in the same format as indicated directly above.
   5. Comply with requirements in Section "Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

1.5 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

   1. Include installation costs in the purchase amount only where indicated as part of the allowance.

2. When requested, prepare explanations and documentation to substantiate the margins claimed.
3. Submit substantiation of a change in scope of work claimed in the Change Orders related to unit-cost allowances.
4. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 21 days.

1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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 REFERENCES AND STANDARDS

A. Applicability: The publications listed in the paragraphs of an individual section shall apply only to the extent referenced within the text of that section. Unless the Contract Documents include more stringent requirements, applicable construction industry standards form a part of these specifications and have the same force and effect as if bound or copied directly into the Contract Documents. Publications are referenced within the text by the basic designation only.

B. Copies of Standards: Owner or the Architect will not provide copies of references cited within the specifications. Copies may be obtained directly from publication source.

1.3 DEFINTIONS

A. Furnish: Purchase and deliver to project site, ready for installation.

B. Install: Unpack, assemble, set in final position, fasten in place, make final connections, clean, adjust, and leave ready for use.

C. Provide: Furnish and install.

D. Receive: Accepting a delivery. (Entity responsible for accepting a delivery.)

E. Final Connections: Complete plumbing, mechanical, and electrical connections as required and recommended by manufacturer for optimum operation of equipment.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract comprises the demolition of the existing classrooms, and associated components, and general construction of new classrooms, offices and support areas.

1. Project Location: 2538 Panola Road
   Stonecrest, Georgia 30058

1.5 WORK BY OWNER OR SEPARATE CONTRACTORS

A. Owner may award separate contracts for work at the Site, which will be executed concurrent with work of this Contract. Consult and cooperate with separate contractors to the full extent provided for in the Conditions of the Contract.

1.6 WORK SEQUENCE

A. The Work will be conducted in a single phase.

1.7 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

1.8 PRODUCTS ORDERED IN ADVANCE

A. General: This shall be done solely by the General Contractor unless otherwise instructed by the owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

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 supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Cleaning and protection.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Project Meetings" for progress meetings, coordination meetings, and pre-installation conferences.
2. Division 1 Section "Submittals" for preparing and submitting the Contractor's Construction Schedule.
3. Division 1 Section "Project Closeout" for coordinating contract closeout.

1.3 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with requirements contained in Section "Submittals."

B. Staff Names: Within 15 days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining, and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High-speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.

24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF SECTION

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 specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

B. This Section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

C. Related Sections: The following Sections contain requirements that relate to this Section.

1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 1 Section "Submittals."

1.3 SCHEDULE OF VALUES

A. Coordination: Each prime Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with preparation of the Contractors' Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's Construction Schedule.
b. Application for Payment forms, including Continuation Sheets.
c. List of subcontractors.
d. Schedule of allowances.
e. Schedule of alternates.
f. List of products.
g. List of principal suppliers and fabricators.
h. Schedule of submittals.

2. Submit the Schedule of Values to the Architect at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

3. Sub-schedules: Where Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of the Architect.
c. Project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.

1) Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.
4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities

from the best indication in the Contract Documents.

8. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

   1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment-Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Applications for Payment.

D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.

   1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Architect by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.

   1. Transmit each copy with a transmittal form listing attachments and recording

appropriate information related to the application, in a manner acceptable to the Architect.

F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who is lawfully entitled to file a mechanics lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.

    a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.

G. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of preconstruction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire the Owner's insurance.
17. Initial settlement survey and damage report, if required.

H. Application for Payment at Substantial Completion: Following issuance of the

Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and submittals that shall precede or coincide with this application include:

    a. Occupancy permits and similar approvals.
    b. Warranties (guarantees) and maintenance agreements.
    c. Maintenance instructions.
    d. Startup performance reports.
    e. Changeover information related to Owner's occupancy, use, operation, and maintenance.
    f. Final cleaning.
    g. Application for reduction of retainage and consent of surety.
    h. Advice on shifting insurance coverages.
    i. Final progress photographs.
    j. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

I. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements (including all hard copy and electronic format documentation).
2. Completion of items specified for completion after Substantial Completion.
3. Ensure that unsettled claims will be settled.
4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
5. Transmittal of required Project construction records to the Owner.
6. Proof that taxes, fees, and similar obligations were paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish, and similar elements.
9. Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: To enable orderly review during progress of the Work, and to provide systematic discussion of problems, the Owner will conduct project meetings throughout the construction period.

1.2 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

A. Agenda Items: To the maximum extent practicable, advise the Owner at least twenty-four (24) hours in advance of project meetings regarding items to be added to the agenda.

B. Minutes:

1. The Contractor will compile minutes of each project meeting, send to Architect for review and comments prior to distribution, correct minutes per comments, if any, and then will distribute a copy to all meeting attendees and others involved in the project.
2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS

(No products are required in this Section)

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

A. Except as noted below for Preconstruction Meeting, Project meetings will be held not less than every other week and may be held weekly if deemed necessary by the Owner.

B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

A. The Owner will establish meeting location. To the maximum extent practical, meetings will be held at the job site.

3.3 PRECONSTRUCTION MEETING

A. Preconstruction Meeting will be scheduled to be held not later than ten (10) working days after the Owner has issued the Notice to Proceed.
1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
2. The Owner will advise other interested parties, including the Architect, and invite their attendance.

B. Minimum agenda: Data will be distributed and discussed on at least the following items.
   1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, material suppliers and Architect;
   2. Channels and procedures for communications;
   3. Construction schedule, including sequence of critical work;
   4. Contract documents, including distribution of required copies of original documents and revisions;
   5. Processing of Shop Drawings and other data submitted to the Architect for review;
   6. Rules and regulations governing performance of Work;
   7. Procedures for safety and first aid, security, quality control, housekeeping and related matters.

3.4 PROJECT MEETINGS

A. Attendance:
   1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
   2. Subcontractors, material suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

B. Minimum Agenda:
   1. Review, revise as necessary and approve minutes of previous meetings;
   2. Review progress of the Work since last meeting, including status of submittals for approval;
   3. Identify problems which impede planned progress;
   4. Develop corrective measures and procedures to regain planned schedule;
   5. Complete other current business.

C. Revisions to minutes:
   1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
   2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
   3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:

1. Contractor's construction schedule.
2. Submittal schedule.
3. Daily construction reports.
4. Shop Drawings.
5. Product Data.
6. Samples.
7. Quality assurance submittals.

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Permits.
2. Applications for Payment.
3. Performance and payment bonds.
4. Insurance certificates.
5. List of subcontractors.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Applications for Payment" specifies requirements for submittal of the Schedule of Values.
2. Division 1 Section "Coordination" specifies requirements governing preparation and submittal of required Coordination Drawings.
3. Division 1 Section "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
4. Division 1 Section "Quality Control" specifies requirements for submittal of inspection and test reports.
5. Division 1 Section "Project Closeout" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.3 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.

1. Preparation of Coordination Drawings is specified in Division 1 Section "Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

    a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

    a. Allow 2 weeks for initial review. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
    b. If an intermediate submittal is necessary, process the same as the initial submittal.
    c. Allow 2 weeks for reprocessing each submittal.
    d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
2. Include the following information on the label for processing and recording action taken.

    a. Project name.
    b. Date.

c. Name and address of the Architect.
d. Name and address of the Contractor.
e. Name and address of the subcontractor.
f. Name and address of the supplier.
g. Name of the manufacturer.
h. Number and title of appropriate Specification Section.
i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. The Architect will not accept submittals received from sources other than the Contractor. Electronic submittal will be acceptable in PDF format with the exception of SAMPLES. However, the submittal shall follow the procedures indicated above and below.

1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 30 days after 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. Indicate graphically the 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. Phasing: On the schedule, show how requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner affect the sequence of Work.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.

E. Cost Correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of payment requests.

1. Refer to Division 1 Section "Applications for Payment" for cost reporting and payment procedures.

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

1. 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.

G. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.6 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
2. Prepare the schedule in chronological order. Provide the following information:

a. Scheduled date for the first submittal.
b. Related Section number.
c. Submittal category (Shop Drawings, Product Data, or Samples).
d. Name of the subcontractor.
e. Description of the part of the Work covered.
f. Scheduled date for resubmittal.
g. Scheduled date for the Architect's final release or approval.

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

1. 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.

C. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.7 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to the Architect at weekly intervals:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Emergency procedures.
9. Orders and requests of governing authorities.
10. Change Orders received, implemented.
11. Services connected, disconnected.
12. Equipment or system tests and startups.
13. Partial Completions, occupancies.
14. Substantial Completions authorized.

1.8 SHOP DRAWINGS

A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 36 by 48 inches (890 by 1220 mm).
7. Initial Submittal: Submit 2 blue- or black-line prints for the Architect's review. The Architect will return one print.
9. Final Submittal: Submit 3 blue- or black-line prints; submit 5 prints where required for maintenance manuals. The Architect will retain 2 prints and return the remainder.
10. Do not use Shop Drawings without an appropriate final stamp indicating action taken.
11. In lieu of hard copies, it is acceptable to submit Shop Drawings complying with the above requirements, in electronic format (PDF's) via email directly to the Architect's Project Manager.

1.9 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. 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.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.
4. Submittals: Submit 5 copies of each required submittal; submit 4 copies where required for maintenance manuals. The Architect will retain one and will return the other marked with action taken and corrections or modifications required. In lieu of hard copies, it is acceptable to submit product data complying with requirements of paragraphs 1-3 above, in electronic format (PDF's) via email directly to the Architect's Project Manager.

    a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

    a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
    b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.10 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample. 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.
f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

   a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
   b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
   c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
   d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.

   a. The Architect will review and return preliminary submittals with the Architect's notation, indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 5 sets. The Architect will return 2 sets marked with the action taken.
5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

   a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
   b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.

a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.11 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications, or on Drawings if not in Master Specification book.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control."

1.12 ARCHITECT'S ACTION

A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When the Architect marks a submittal "No Exceptions Taken," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. Final-But-Restricted Release: When the Architect marks a submittal "Exceptions as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
3. Returned for Resubmittal: When the Architect marks a submittal "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
4. Not Approved: When the Architect marks a submittal "Rejected" do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Prepare a new submittal.

a. Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress.

5. Supplementary Submittal: When the Architect marks a submittal “Submit Specified Item” submit the exact item as indicated in Contract Documents.

6. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal to sender without action.

C. Unsolicited Submittals: The Architect will discard unsolicited submittals without action and notify sender in writing (including email) that submittal was unsolicited.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Contractor shall provide, at his expense, all testing and inspecting services.
   2. Contractor is responsible for scheduling inspections and tests and notifying testing agency.
   3. Retesting and Reinspecting: Contractor shall pay for additional testing and inspecting required as a result of tests and inspections indicating noncompliance with requirements.

B. Performance and Design Criteria: Where design services or certifications by a professional engineer are required by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
   2. 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.

C. Submittals: Testing agency shall submit a certified written report of each inspection and test to Owner, Architect, Contractor, structural engineer, and to authorities having jurisdiction when authorities so direct. Reports of each inspection, test, or similar service shall include the following:
   1. Name, address, and telephone number of testing agency.
   2. Project title and testing agency's project number.
   3. Date of report and designation (number).
   4. Dates and locations where samples were taken or inspections and field tests made.
   5. Ambient conditions at the time of sample taking and inspecting or field testing.
   6. Names of individuals taking the sample or making the inspection or test.
   7. Product and test method.
   8. Inspection or test data including interpretation of test results and comments or professional opinion on whether inspected or tested Work complies with requirements.
   9. Recommendations on retesting or reinspection.
   10. Name and signature of laboratory inspector.

D. Testing Agency Qualifications: Agencies that specialize in the types of inspections and tests to be performed and are acceptable to authorities having jurisdiction.

E. Testing Agency Responsibilities: Testing agency shall cooperate with Architect and Contractor in performing its duties and shall provide qualified personnel to perform inspections and tests.
   1. Agency shall promptly notify Architect and Contractor of deficiencies in the Work observed during performance of its services.
   2. Agency shall not release, revoke, alter, or enlarge requirements of the Contract Documents nor approve or accept any portion of the Work.
   3. Agency shall not perform duties of Contractor.

F. Auxiliary Services: Cooperate with testing agencies and provide auxiliary services as requested, including the following:

   1. Access to the Work.

2. Incidental labor and facilities to assist inspections and tests.
3. Adequate quantities of materials for testing, and assistance in taking samples.
4. Facilities for storing and curing test samples.
5. Security and protection for samples and test equipment.

1.2 TESTING AND INSPECTION SERVICES

A Testing and inspecting services are not limited to the items listed below. Contractor shall provide all testing and inspecting services specified below and in other Sections of these Specifications or the Drawings, or are required by authorities having jurisdiction and shall be performed by independent testing agencies. Contractor shall engage an independent testing agency service per the qualifications indicated above. Reports of these tests shall be documented and distributed in accordance with the above stated requirements.

B. The following tests and inspections are required:
1 Concrete Moisture
2 Mold

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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 governing the Contractor's selection of Information Technology vendors for use in the Project.

1. Subcontractors Contracts: Provisions of this Section apply to the construction activities of each subcontractor.

1.3 SECTION REQUIREMENTS

A. Scheduling and Coordination for the installation of all information technology systems (including but not limited to low voltage electrical for cable, telephone, data, fiber, SAN, security cameras, and speakers) shall be the responsibility of the Contractor.

1. Contractor shall provide all conduit and boxes for the Work.

B. Contractor shall coordinate work with Owners vendor/installer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide temporary facilities and controls needed for the Work including, but not necessarily limited to:
   1. Temporary utilities such as heat, water, electricity and telephone;
   2. Field office for the Contractor's personnel and area for meetings with Owner and Architect or Owner's other Consultants;
   3. Sanitary facilities;
   4. Temporary barriers of the construction site;
   5. Project sign – Sign shall be approved and include the Owner and Architect's information.

B. Related Work:
   1. Except that equipment furnished by Subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.

1.2 PRODUCT HANDLING

A. Maintain temporary facilities and controls in proper and safe conditions throughout progress of the Work.

PART 2 - PRODUCTS

2.1 UTILITIES

A. General: The Contractor shall provide water and electrical power utility service required by the Work.

B. Water:

   1. Provide necessary temporary piping and water supply and, upon completion of the Work, remove such temporary facilities.

C. Electricity:
   1. Provide necessary temporary wiring and, upon completion of the Work, remove such temporary facility.
   2. Provide area distribution boxes so located that the individual trades may furnish and use 100 ft. maximum length extension cords to obtain power and lighting at points where needed for Work, inspection and safety.

D. Telephone:
   1. Make necessary arrangements and pay costs for installation and operation of telephone service to the Contractor's office at the site.
   2. Make the telephone available to the Architect and Owner for use in connection with the Work.

2.2 FIELD OFFICES AND SHEDS

A. Contractor's facilities:
   1. Provide a field office building and sheds adequate in size and accommodation for Contractor's offices, supply and storage.

2. Within the Contractor's facilities, provide enclosed space adequate for holding project meetings. Furnish with table, chairs and utilities.

B. Sanitary facilities:
   1. Provide temporary sanitary facilities in the quality required for use by all personnel.
   2. Maintain in a sanitary condition at all times.

2.3 ENCLOSURES

A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

2.4 TEMPORARY BARRIERS

A. Provide and maintain for the duration of construction a temporary barrier as required, of design and type needed to prevent entry onto the Work by the public. Install and maintain thereon "Hazardous Area" signs sufficient to warn the public.
   1. Provide 6 foot high chain link fence.

2.5 PROJECT SIGNS

A. Prior to start of construction, submit proposed Project sign layout to the Architect for approval.
   1. Furnish and install a minimum of one (1) Project Sign.
   2. Project sign shall include the name and logo of Architect and Owner.
   3. Mount Sign at job site where directed by Architect and Owner.
   4. Except as otherwise specifically approved by the Owner, do not permit other signs or advertising on the job site.
   5. Project sign shall be erected on site within 14 days of NTP.
   6. Project sign shall be no less that 4' x 8'. Double sided.

B. Manufacturer:
   1. A+Signs. Decatur, GA.
   2. FAST SIGNS, Smyrna, GA.
   3. FAST SIGNS, Tucker, GA.
   4. FruArt, Decatur, GA.
   5. Rapid Signs, Atlanta, GA
   6. Other manufacturers who provide the specified sign type.

C. Materials:
   1. 96 in. x 48 in. x ¾ in. Plywood.
   2. Weather resistant Paint & vinyl coatings.
   3. 4 x 4 Wood Lumber. Provide other lumber as required by contractor's design for sign support
   4. Fasteners

D. Execution:
   1. Embed wood lumber post in ground. Mount sing to posts. Brace with wood lumber as necessary.
   2. Install sign erect and plumb.
   3. Maintain sign installation throughout project duration.
   4. Remove sign when directed by Owner.

2.6 TRANSPORTATION FACILITIES

A. Truck and equipment access:
   1. To avoid traffic conflict with vehicles of the Owner's employees, and to avoid overloading of streets and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the ACCESS ROUTE as directed by the Architect.
   2. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site.

B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Architect.

PART 3 - EXECUTION

3.1 SECURITY

A. Restrict the access of all persons entering upon the Owner's property in connection with the Work to the Access Route and to the actual site of the Work. The Contractor is responsible for providing adequate security to the building and its contents during the construction period. When school is in session and the Contractor is on the premises, the Owner and Contractor will be jointly responsible for security of the building. When the Contractor is on the premises after school hours and no owner's representative is on the premises, the Contractor will be fully responsible for security.

END OF SECTION

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 governing the Contractor's selection of products for use in the Project.

1. Multiple Prime Contracts: Provisions of this Section apply to the construction activities of each prime contractor.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.
2. Division 1 Section "Substitutions" specifies administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
   b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.

2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.4 SUBMITTALS

A. Product List: Prepare a schedule in tabular form showing each product used in the project. Include the manufacturer's name and proprietary product names for each item listed.

B. Product List: Prepare a list showing products specified in tabular form acceptable to the Architect. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
2. Form: Prepare product list with information on each item tabulated under the following column headings:

   a. Related Specification Section number.
   b. Generic name used in Contract Documents.
   c. Proprietary name, model number, and similar designations.
   d. Manufacturer's name and address.
   e. Supplier's name and address.
   f. Installer's name and address.
   g. Projected delivery date or time span of delivery period.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.

   a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list. Provide a written explanation for omissions of data and for known variations from Contract requirements.
5. Architect's Action: The Architect will respond in writing to Contractor within 2 weeks of receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architect's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each prime contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate contractors.
2. If a dispute arises between prime contractors over concurrently selectable, but incompatible products, the Architect will determine which products shall be retained and which are incompatible and must be replaced.

C. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with the Contract Documents.
2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.

D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. “Note that if a brand name is used an approved equal may be substituted. Instructions for “Requests for Substitutions” may be found in the General Conditions section. Substitutions must be approved by the Owner prior to award by the Local Council/Commission.”
2. Semi-proprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.

    a. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated.

    a. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.

6. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
7. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.

    a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.

8. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
   2. Division 1 Section "Submittals" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.

1.3 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions.

1.4 SUBMITTALS

A. Substitution Request Submittal: The Architect will consider requests for substitution if received within 30 days after commencement of the Work. Requests received more than 30 days after commencement of the Work may be considered or rejected at the discretion of the Architect.
   1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
   2. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a change order.
      a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Post Award Submittal Instructions For Substitutions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents.
3. The request is timely, fully documented, and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
5. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.

B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for cutting and patching.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Coordination" for procedures for coordinating cutting and patching with other construction activities.
2. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.03 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Owner requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
3. List products to be used and firms or entities that will perform Work.
4. Indicate dates when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.

1.04 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:

    a. Bearing and retaining walls.
    b. Structural concrete.
    c. Structural steel.
    d. Lintels.
    e. Timber and primary wood framing.
    f. Structural decking.
    g. Miscellaneous structural metals.
    h. Equipment supports.
    i. Piping, ductwork, vessels, and equipment.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

    a. Primary operational systems and equipment.
    b. Air or smoke barriers.
    c. Water, moisture, or vapor barriers.
    d. Membranes and flashings.
    e. Fire protection systems.
    f. Noise and vibration control elements and systems.
    g. Control systems.
    h. Electrical wiring systems.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1. If possible retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

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

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated (if necessary) until provisions have been made to bypass them.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction.

2. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
3. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
4. Cut through concrete using a cutting machine, such as a Carborundum saw or a diamond-core drill.
5. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
6. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

B. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

3.04 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cleaning and maintenance of site premises.

1.2 REGULATORY REQUIREMENTS

A. Codes and Standards: Comply with applicable Federal, State and Local codes and regulations relative to environmental safety regulations.

B. Hazards Controls: Store volatile waste in covered metal containers and remove from premises daily. Prevent accumulation of wastes which create hazardous conditions.

C. Pollution Control:
   1. Do not burn or bury rubbish and waste materials on the project site.
   2. Do not disposal of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways.
   3. Do not disposal of any toxic chemicals in storm or sanitary sewer systems. Comply with EPA requirements regarding disposal.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

C. Cleaning materials shall be clearly labeled and safely stored when not in use. Maintain control of cleaning materials while in use. Do not leave unattended. No flammable materials or liquids may be stored in the existing building or in the new addition.

PART 3 - EXECUTION

3.1 CLEANING REQUIREMENTS

A. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.

B. In exterior work, sprinkle dusty debris with fine water mist to control accumulation of dust. Avoid puddling.

C. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.

D. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

E. Clean exterior premises daily. Do not let debris enter customer areas.

3.2 TRASH REMOVAL

A. On a daily basis, clean work areas and access, and dispose of waste materials, rubbish and debris.

B. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.

C. Keep streets and access to site free of rubbish and debris.

3.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection as follows:
   1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   4. Remove tools, construction equipment, machinery, and surplus material from Project site.
   5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   7. Clean debris from roofs, gutters, downspouts, and drainage systems.
   8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   9. Vacuum clean all interior floor surfaces.
   10. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   11. Remove labels that are not permanent.
   12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   13. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign substances.
   14. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   15. Replace disposable air filters and clean permanent air filters of equipment operated during construction. Clean exposed surfaces of diffusers, registers, and grills.
   16. Clean ducts, blowers, and coils if units were operated without filters during construction.
   17. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures.
   18. Leave Project clean and ready for occupancy.

B. Cleaning of Toilets Prior to Possession:
   1. Immediately prior to possession, clean toilets thoroughly including each toilet fixture and accessory.

2. Clean entire wall and floor surfaces using cleaning solutions and wipe dry to prevent surface film or residue.
3. Clean water closets and sinks with scrubbing cleansers to remove stains and deposits.
4. Clean and polish stainless steel accessories and toilet partitions to a spotless luster using soap, ammonia, or mild detergent and water. Apply with sponge or soft cloth, rinse with clear water, and wipe dry. As an alternate, use a commercial stainless steel cleaner and polish.
5. Clean mirror surfaces using glass cleaner.

C. Employ skilled workmen for final cleaning.

D. Prior to final completion or Owner possession, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas with the Owner's Representative to verify that entire Work is clean.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer’s standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Submittals" specifies procedures for submitting warranties.
2. Division 1 Section "Project Closeout" specifies contract closeout procedures.
3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.
4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Separate Prime Contracts: Each prime contractor is responsible for warranties related to its own contract.

1.3 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, 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.

1.5 SUBMITTALS

A. 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 for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

B. 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.

C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to individual specification sections and Construction Drawings for specific content requirements and particular requirements for submitting special warranties.

D. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

E. 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.

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.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 LIST OF WARRANTIES

A. Schedule: ***Provide warranties on Products and Installations for all elements of work included in the scope of this project.***

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

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

B. Section Includes
1. Descriptions of Requirements.
2. Closeout Procedures.
3. Final Closeout Submittals.
4. Project Record Documents.
5. Operations and Maintenance Data.
6. Warranties and Bonds.

1.2 DESCRIPTION OF REQUIREMENTS:

A. Definitions:
1. Project closeout is the term used to describe certain collective project requirements, indicating completion of the work that are to be fulfilled near the end of the Contract time in preparation for final acceptance and occupancy of the work by the Owner, as well as final payment to the Contractor and the normal termination of the Contract.

2. Substantial Completion shall be the term as defined by the Contract, including General and Supplemental Conditions.

3. Final Completion shall be the term as defined by the Contract, including General and Supplemental Conditions.

B. Time of closeout is directly related to “Substantial Completion”; therefore, the time of closeout may be either a single time period for the entire work or a series of time periods for individual elements of the work (phases) that have been certified as substantially complete at different dates. This time variation, if any, shall be applicable to the other provisions of this section.

1.3 CLOSEOUT PROCEDURES:

A. General: Comply with closeout submittal requirements defined within individual Sections. Submittal procedures described herein shall apply unless described in individual Sections.

B. Compete all work covered in the Contract Documents before requesting the Architect/Engineer’s inspection for certification of substantial completion, either for the entire work or for portions of the work.

C. When Contractor considers Work to be Substantially Complete, submit written certification to Owner's Representative and Architect as follows:

1. Contract Documents have been reviewed.

2. Work has been inspected.

3. Work is complete in accordance with Contract Documents.

4. Work is ready for inspection.

5. Request the Architect/Engineer's inspection for certification of substantial completion. Provide a punch list of known exceptions (a comprehensive list of items to be completed or corrected prior to final payment) in the request.

D. Substantial Completion Inspection: Upon receipt of Contractors written certification and request for the Architect/Engineer's inspection for certification of substantial completion, the Architect/Engineer shall make an inspection to determine whether or not the Work is substantially complete.

1. If Architect's inspection discloses any item which is not sufficiently complete in accordance with the Contract Documents:
   a. A certificate of Substantial completion will not be issued.
   b. The Architect will provide the Contractor a list of items that shall be completed or corrected in order to achieve Substantial Completion.
   c. The Contractor shall promptly complete or correct all items indicated in order to achieve Substantial Completion.
   d. Contractor shall provide to Architect documented evidence of items completed in the format acceptable to Architect.
2. When Work is substantially complete, the Architect will prepare and submit the Certificate of Substantial Completion in accordance with the Contract.

E. In the progress payment following the date substantial completion complete the administrative actions and submittals indicated in Section 01250 for Application for payment at Substantial Completion.

1. Include supporting documentation for completion as indicated in these contract documents.

2. Submit a statement showing an accounting of changes to the Contract Sum.

3. Advise Owner of pending insurance changeover requirements.

4. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents, and test and balance reports

5. Obtain and submit releases enabling the Owner's full, unrestricted use of the work and access to services and utilities. Where required, include occupancy permits, operating certificates, and similar releases.

6. Deliver extra stock of material and similar physical items to the Owner.

7. Make the final changeover of locks and transmit the keys to the Owner. Advise the Owner's personnel of the changeover in security provisions.

8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities and services from the project site, along with construction tools and facilities, mockups, and similar elements.

9. Complete final cleaning up requirements, including touch-up painting of marred surfaces.

10. Touch-up and otherwise repair and restore marred exposed finishes.

11. Inspection Procedures: See General and Supplementary Conditions.

F. Final Inspection: Upon receipt of Contractors written notice that Work, including punch list items resulting from earlier inspection, has been completed and is ready for final inspection and acceptance and having received the final Application for payment, the Architect will make an inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will issue the Final Certificate of Payment.

G. Reinspection Procedures: The Architect/Engineer will reinspect the Work upon receipt of the Contractor's notice that the Work, including punch-list items resulting from earlier inspection, has been completed, except for these items whose completion has been delayed because of circumstances that are acceptable to the Architect/Engineer.

1. Upon completion of reinspection, the Architect/Engineer will either recommend of final acceptance to the Owner, advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance.
2. If necessary, the reinspection procedure will be repeated. All reinspections by the Architect/Engineer from this point are considered additional services, and shall be performed at the expense of the Contractor.

1.4 FINAL CLOSEOUT SUBMITTALS:

A. General Closeout Submittals: Complete the following before requesting the Architect/Engineer's final inspection for recommendation of final acceptance and final payment as required by the General Conditions. List known exceptions, if any, in the request.

B. Specific Closeout Submittals: Closeout submittals are submittals specified in the individual sections as "Closeout" and shall not be otherwise considered a closeout document regardless of the type of submittal. Submittals not classified as a closeout submittal shall be considered a regular submittal under the provisions of Section 01330. For example: Maintenance Data may, or may not, be classified as a closeout unless specifically identified as a closeout in the individual section Part 1 SUBMITTAL paragraph.

C. Unless otherwise specified in the individual sections, submit closeout submittals to the Owner within 90 days after Substantial Completion of the Work.

D. All closeout documents specified in the individual sections shall be submitted. Specific documents listed below shall be included separately in hard copy format and an Electronic Closeout Document Submission as specified hereinafter.

E. Final closeout submittals shall be received and approved by Owner before final application for payment will be approved.

1. Submit the final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit a certified copy of the Architect/Engineer's final punch-list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.

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3. Submit final meter readings for utilities, a measured record of stored fuel, and similar data either as of the date of Substantial Completion, or else when the Owner took possession of and responsibility for corresponding elements of the Work.

4. Submit consent of surety to final payment, AIA Document G707, (4 copies with original signatures).

5. Submit a final liquidated damages settlement statement, acceptable to the Owner.

6. Submit Statutory Affidavit (4 copies with original signatures).

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. Submit Certificate and Release (4 copies with original signatures).

1.5 ELECTRONIC CLOSEOUT DOCUMENT SUBMISSION:

A. Submit 2 sets of CD's of all documents provided in closeout submittal package.

B. If Contractor fails to provide a fully completed Electronic Closeout Document Submission within 90 days after Substantial Completion of the Work, then Contractor agrees to pay Owner the sum of $250.00 per day, as liquidated damages and not as a penalty, until the fully completed Electronic Closeout Document Submission is received and approved by Architect.

C. Contractor shall upload of specific project information to database referenced in section 01790.

D. Architect's/Engineer's review of the closeout submittal package shall be limited to (2) two reviews as part of basic services. Additional reviews shall be performed at the expense of the Contractor.

1.6 PROJECT RECORD DOCUMENTS:

A. General: Specific requirements for record documents are indicated in the individual sections of these specifications. Other requirements are indicated in the General and Supplementary Conditions. General submittal requirements are indicated in the various "submittals" sections.

1. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's and Clerk-of-the-Work's reference during normal working hours.

B. Maintain on site one set of the following record documents. Record actual revisions to the Work.
1. Contract Drawings.
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.

C. Maintain Record Documents separate from documents used for construction.

D. As-built Record Documents and Shop Drawings: Record as-builts shall be maintained and submitted for the primary purpose of recording the locations for concealed interior and exterior underground utilities as specified in the individual specifications. Legibly record actual measured horizontal and vertical locations of interior and exterior underground utilities and appurtenances, referenced to permanent surface improvements. Mark up the set of record documents to show the actual installation where the installation work varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing the actual "field" condition fully and accurately; however, where Shop Drawings are used for markup, record a cross-reference at the corresponding location on the working drawings. Give particular attention to concealed work that would be difficult to measure and record at a later date

1. Mark record sets with red erasable pencil and, where feasible, use other colors to distinguish between variations in separate categories of the work.

2. Mark-up new information which is known to be important to the Owner, but for some reason was not shown on either Contract Drawings or Shop Drawings.

3. Note related change-order numbers where applicable.

4. Organize record drawing sheets into manageable sets, bind with durable-paper cover sheets; and print suitable titles, dates, and other identification on the cover of each set.

E. Record required as-built information concurrent with construction progress. Do not permanently conceal work until required information has been recorded.

F. At Project completion, the Contractor shall place one set the Record Documents (including Building and Civil Record Drawings, Specifications, Addenda, and Change Orders) enclosed in a plastic pipe tube (fixed cap at one end and a threaded-cap on the other end) for storage in the Electrical Room.

1.7 OPERATION AND MAINTENANCE DATA:

A. Manuals: Organize operating and maintenance data into at least three (3) suitable sets of manageable size. Bind data into individual binders, properly identified and indexed. Bind each set of data in heavy-duty, 2-inch, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on both front and spine of each binder.

B. Include the following types of information in operation and maintenance manuals:
1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn-around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Additional requirements specified in Mechanical and Electrical Divisions.

1.8 WARRANTIES AND BONDS:

A. Submit required warranties and bonds
1. Assemble documents from Subcontractors, suppliers, and manufacturers.
2. For equipment put into use with Owner's acceptance during construction, submit within ten days after first operation, listing date of acceptance as start of warranty period.
3. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT TRAINING, DEMONSTRATION, AND INSTRUCTIONS:

A. General Operation and Maintenance Instructions: Arrange for each Installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site with the Owner's personnel and Clerk-of-the-works to provide necessary basic instruction in proper operation and maintenance of the entire work. Where installers are not experienced in the required procedures, include instruction by the manufacturer’s representatives.

1. As part of this instruction, provide a detailed review of the following items:

a) Maintenance manuals.
b) Record documents.
c) Spare parts and materials.
d) Identification systems.
e) Control sequences.
f) Hazards.
g) Cleaning.
h) Warranties and bonds maintenance agreements and similar continuing commitments.

B. As part of this instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING:

A. General: Special cleaning requirements for specific units of work are included in the appropriate sections of the other Divisions of the Specifications. General cleaning during the regular progress of the work is required by the General Conditions and is also included under Section 01500 – TEMPORARY FACILITIES AND CONTROLS.

B. Cleaning: Provide final cleaning of the work at the time indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions for operations.

1. Complete the following cleaning operations before requesting the Architect/Engineer's inspection for final acceptance or certification of Substantial Completion.

2. Remove labels which are not required as permanent labels.

3. Clean transparent materials, including mirrors and glass in doors and windows, to a polished condition. Remove putty and other substances which are noticeable as vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

4. Clean exposed exterior and interior hard-surfaced finishes to a condition that is free of dust, stains, films, and similar noticeable distracting substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

5. Wipe surfaces of mechanical and electrical equipment clean. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

6. Clean the project site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas to a broom clean condition; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection: Except as otherwise indicated or requested by the Architect/Engineer, remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work during the remainder of the construction period.

D. Compliance: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile or other harmful or dangerous materials into drainage system. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated work have become the Owner's property, dispose of these materials to the Owner's best advantage as directed.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

A. Work covered in this section includes:
   1. Requirements for electronic submittal of Warranties, Project Records and Project Related Data.
   2. Contractor Warranty Form
   3. Subcontractor or Installer Warranty Form
   4. Contractor Self Performing Trade Work or Installation Warranty Form
   5. Contractor Affidavit Certifying that Specific Requested Documentation is Not Applicable
   6. Contractor Exit Affidavit

B. Related Sections
   1. Section 01770 Project Closeout.
   2. Section 01740 Warranties.

1.2 DESCRIPTION OF REQUIREMENTS:

A. General: Where the Contract Documents require submittals as directed by the Owner, Architect or other Owner's Representative, those items shall be submitted as otherwise directed. This section refers to data required from the Contractor to populate the Owner's electronic project database and provides instructions for the collection of select project documents and data in electronic form. Those select items are listed below in this Section. Items listed in this Section may be the same, similar or related to items requested by others or as otherwise indicated in the Contract documents. The Contractor may request of others collecting documentation on behalf of the Owner, if items required by this Section will suffice in whole or in part as substitution for items otherwise requested. Items of this Section shall be provided as directed in this Section. Waiver or substitution of items required by this Section is not allowed.

1.3 SUBMITTAL PROCESS:

A. General: Documents and data collected for the project are electronic in nature. Contractor shall have access to the internet to fulfill the requirements of this Section. Within five (5) days of Contract execution, Contractor shall register himself as a user of the system by going to the website www.FDT4contractors.com, by emailing to contractorsupport@fdtech1.com or by calling 1-844-fdtech1. Once registered, the Contractor may access his Dashboard. Project may be shown on the Dashboard if previously set up by the Owner. If project is not shown, follow the instructions to Add a Project.

1.4 ELECTRONIC FORMS:

A. General: Upon access to the Owner's Database, Contractor shall be asked to complete electronic forms. Follow instructions to complete required electronic forms. Applicable electronic data forms from the following list shall be completed by Contractor. List is subject to change.
   1. Contractor Information.

2. General Project Information

3. Project Details

4. Area of Work

5. Contract Documents

6. Permits

7. Photos

8. Subcontractors of Installers

9. Product Information

10. GC and Installer Warranties

11. Change Orders and Other Contract Documents

12. As-builts

13. Test

14. Closeout Dates

1.5 ELECTRONIC SUBMITTALS:

A. The following minimum documents shall be electronically provided by Contractor into the electronic database.

1. All required permits (Building Permit, Site Development Permit, Mechanical Permit, Electrical Permit, Plumbing Permit, Right-of-Way Permit, Fire Systems Permit, any other permits obtained in the performance of the Project).

2. Fully Executed Contract Documents complete with all attachments (Contract, General Conditions, Supplementary Conditions, Contract Drawings, Contract Specifications, Addenda, Fully Executed Change Orders and Change Directives, all other documents that constitute amendments to Contract).

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3. As-built Plans.

4. All test reports (Test & Balance, Concrete, all other test reports).

5. Certificate of Completion or Certificate of Occupancy.

6. Sub-Contractor and Installer list complete with Company Name, Contact Person, Address, email, phone and fax.

7. Substantial Completion form, fully executed.

8. Final Completion form, fully executed.

9. Project Photos

10. Product Data

11. Operation and Maintenance documents, submitted as separate electronic file per item

12. Manufacturer Warranties, fully executed, project specific, submitted as separate electronic file per item

13. Tests

14. Contractor Warranty Form, fully executed

15. Subcontractor of Installer Warranty forms, fully executed, submitted as separate electronic file per item

16. Contractor Self Performing Trade Work or Installation Warranty Form.

17. Manufacturer Warranties, fully executed, project specific, submitted as separate electronic file per item.

18. Contractor Affidavit Certifying that Requested Documentation is Not Applicable, per document where applicable, fully executed.

19. Contractor Exit Affidavit, fully executed.

20. Competed Electronic Forms provided in the database.

B. Format: Uploaded documents shall be provided in *.pdf format, with the exception of photos. Photos shall be submitted as *jpg.

C. Size: *.pdf shall be no larger than size indicated by the system instructions. *.jpg shall be no larger than size indicated by the system instructions.

D. Final Naming: File names shall representative of the document therein. File names shall be no longer than fifteen (15) characters. Other file naming instructions may be applicable as indicated in the database.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TIME:

A. Contractor shall register to enter the electronic database within 5 days of Contract Execution.

B. Contractor shall complete Sections 1 through 5 of the electronic forms within 10 days of Contract Execution. Those sections are entitled, Contractor Information, General Project Information, Project Details, Areas of Work and Contract Documents

C. Contractor shall submit permit information and upload permit documents within 5 days of receipt of permits.

D. Contractor shall submit minimum 5 existing conditions photos in Section 7 of the electronic forms within 15 days of Contract Execution.

E. Contractor shall enter subcontractors and installers into database within 5 days of engaging said sub-contractor or installer to work on Owner's site.

F. Contractor shall begin submitting all other data as early as it is available.

G. Contractor shall complete all submittals of this Section as a pre-requisite to project close-out and final payment for this project.

END OF SECTION

CONTRACTOR WARRANTY FORM

PROJECT:

LOCATION:

OWNER:

I/We,_____(Company under Contract with Owner) , Contractor for the above referenced project, do hereby warrant that all labor and work performed are in accord with Contract Documents and are of professional quality and all materials and equipment furnished are of good quality and new unless otherwise allowed in the Contract Documents. Contractor warrants all will be free from defects due to defective materials or workmanship for a period of one year from Date of Substantial Completion or other Date of Acceptance as approved by the Owner. Contractor further warrants that workmanship or installation shall not result in void of warranty by any manufacturer of products or equipment installed. Such additional guarantee by the Contractor regarding manufacturer's warranties shall survive for the full term of the manufacturer's warranty, which may be beyond the one year indicated in the standard Contractor warranty period.

This warranty commences on _____(Date Accepted by Owner)____. The warranty expires on midnight _____(One year from Date Accepted by Owner) , EXCEPT where any work of Contractor results in void of manufacturer's warranty. The Contractor shall additionally warrant the work to a period consistent with the warranty term of the applicable manufacturer's warranty in the case where Contractor's work under the contract is found to have caused a manufacturer's warranty to be voided.

Should any defect develop during the warranty period due to improper materials, workmanship or arrangement, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner.

The Owner will give Contractor written notice of defective work. Where the Contractor fails to correct defective work within 30 days after receiving written notice, the Owner may, if he chooses, correct defects and charge Contractor costs for such correction. Contractor agrees to pay such charges upon demand from the Owner.

Nothing in the above shall be deemed to apply to work which has been abused, neglected or otherwise misused or unmaintained by the Owner, representatives of the Owner or others.

Guarantor: _____
(Contractor under contract with Owner)

By:_____
(Print Name)

Title: _____
(Print Title)

Signature: _____
(Above Named indicates he/she is an authorized representative of Guarantor):

Notary Public: _____

My Commission Expires _____

This _____ day of _____, 20___.

END OF FORM

SUBCONTRACTOR OR INSTALLER WARRANTY FORM

PROJECT:

LOCATION:

OWNER:

I/We,_____{Company Name}_____, Subcontractor to (Company Name of General Contractor) for _____(List one trade only. Use additional sheets for more trades) ; as described in Specification Section(s) _____(List Appropriate Sections of Specifications, as applicable)____do hereby warrant that all labor and work performed are in accord with Contract Documents and are of professional quality and all materials and equipment furnished are of good quality and new unless otherwise allowed in the Contract Documents. Sub-contractor warrants all will be free from defects due to defective materials or workmanship for a period of _____year(s) from Date of Substantial Completion or other Date of Acceptance as approved by the Owner. Sub-contractor further warrants that workmanship or installation shall not result in void of warranty by any manufacturer of products or equipment installed. Such additional guarantee by the Sub-contractor regarding manufacturer's warranties shall survive for the full term of the manufacturer's warranty, which may be beyond the year(s) indicated in the standard Sub-contractor warranty period indicated above.

This warranty commences on _____(Date Accepted by Owner)____. The warranty expires on midnight _____(_____) year(s) from Date Accepted by Owner , EXCEPT where any work of sub-contractor results in void of manufacturer's warranty. The Sub-contractor shall additionally warrant the work to a period consistent with the warranty term of the applicable manufacturer's warranty in the case where Sub-contractor's work is found to have caused a manufacturer's warranty to be voided.

Should any defect develop during the warranty period due to improper materials, workmanship or arrangement, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner. The Owner will give Sub-contractor written notice of defective work. Where the Sub-contractor fails to correct defective work within 30 days after receiving written notice, the Owner may, if he chooses, correct defects and charge sub-contractor costs for such correction. Contractor and Subcontractor individually and collectively agree to pay such charges upon demand from the Owner.
Nothing in the above shall be deemed to apply to work which has been abused, neglected or otherwise misused or unmaintained by the Owner, representatives of the Owner or others.

Guarantor: _____
(Subcontractor or Installer)
By:_____
(Print Name)

Title: _____
(Print Title)
Signature: _____

Guarantor: _____
(General Contractor)
By:_____
(Print Name)

Title: _____
(Print Title)
Signature: _____

(Above Named Signatories indicate he/she are authorized representative of Respective Guarantors)

Notary Public: _____

My Commission Expires _____

This _____ day of _____, 20___.

END OF FORM

CONTRACTOR SELF PERFORMING TRADE WORK OR INSTALLATION WARRANTY FORM

PROJECT:

LOCATION:

OWNER:

I/We,_____(General Contractor Company Name) , have SELF PERFORMED the specific trade work and/or Installation for _____(List ONE trade only. Use additional sheets for more trades) ; as described in Specification Section(s) _____(List Appropriate Sections of Specifications, as applicable) do hereby warrant that all labor and work performed are in accord with Contract Documents and are of professional quality and all materials and equipment furnished are of good quality and new unless otherwise allowed in the Contract Documents. Sub-contractor warrants all will be free from defects due to defective materials or workmanship for a period of _____year(s) from Date of Substantial Completion or other Date of Acceptance as approved by the Owner. Contractor further warrants that workmanship or installation shall not result in void of warranty by any manufacturer of products or equipment installed. Such additional guarantee by the Contractor regarding manufacturer's warranties shall survive for the full term of the manufacturer's warranty, which may be beyond the year(s) indicated in the standard Sub-contractor warranty period indicated above.

This warranty commences on _____(Date Accepted by Owner)____. The warranty expires on midnight _____(_____) year(s) from Date Accepted by Owner , EXCEPT where any work of Contractor results in void of manufacturer's warranty. The Contractor shall additionally warrant the work to a period consistent with the warranty term of the applicable manufacturer's warranty in the case where Sub-contractor's work under is found to have caused a manufacturer's warranty to be voided.

Should any defect develop during the warranty period due to improper materials, workmanship or arrangement, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner. The Owner will give Contractor written notice of defective work. Where the Contractor fails to correct defective work within 30 days after receiving written notice, the Owner may, if he chooses, correct defects and charge Contractor costs for such correction. Contractor agrees to pay such charges upon demand from the Owner.

Nothing in the above shall be deemed to apply to work which has been abused, neglected or otherwise misused or unmaintained by the Owner, representatives of the Owner or others.

Guarantor: _____
(Contractor)
By:_____
(Print Name)

Title: _____
(Print Title)
Signature: _____
(Above Named Signatory indicates he/she is the authorized representative of Guarantor)

Notary Public: _____

My Commission Expires _____
This _____ day of _____, 20___.

END OF FORM

CONTRACTOR AFFIDAVIT CERTIFYING THAT REQUESTED SPECIFIC DOCUMENTATION IS NOT APPLICABLE

PROJECT:

LOCATION:

OWNER:

I/We,_____(Contractor Company Name) , Contractor for the above referenced project, do hereby warrant that ,_____(Title of Specific Document or Item, Enter ONE document or Item per Affidavit. Use additional sheets if other documents or items apply) was requested by the data collection system is Not Applicable to the Project indicated above. The specific document or item requested is Not Applicable because

_____

_____

_____

(Enter all relevant details as to why the above named document or item is not applicable).

Affiant: _____
(Contractor)

By:_____
(Print Name)

Title: _____
(Print Title)

Signature: _____
(Above Named Signatory indicates he/she is the authorized representative of Guarantor)

Notary Public: _____

My Commission Expires _____
This _____ day of _____, 20___.

END OF DOCUMENT

CONTRACTOR EXIT AFFIDAVIT

PROJECT:

LOCATION:

OWNER:

I/We,_____(Contractor Company Name) , Contractor for the above referenced project, do hereby warrant the following:

1. That CONTRACTOR WARRANTY has been properly executed and submitted by Contractor.

2. That all sub-contractors and Installers who have provided services on the project have properly executed a SUBCONTRACTOR OR INSTALLER WARRANTY as necessary for each area of work and that each has been submitted by Contractor.

3. That where Contractor Self-Performed trade work or installation, a properly executed CONTRACTOR SELF PERFORMING TRADE WORK OR INSTALLATION WARRANTY has be completed and submitted by Contractor

4. That all requested Manufacturer's Warranties have been prepared specific for this project and submitted by Contractor.

5. That Operations and Maintenance manuals have been provided for all project elements

6. That designated Owner Representative have been appropriately trained on the operation of all equipment and systems

7. That spare parts and excess materials have been provided to designated Owner Representative, where required

8. That all requested or required data has been provided for storage on the Owner's electronic database.

9. That all information and documentation provided on products and services is complete and correct to the Contractor's knowledge.

Affiant: _____
(Contractor)

By:_____
(Print Name)

Title: _____
(Print Title)

Signature: _____
(Above Named Signatory indicates he/she is the authorized representative of Guarantor)

Notary Public: _____

My Commission Expires _____
This _____ day of _____, 20___.

END OF DOCUMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Load bearing formed steel stud exterior and interior framing 20 gage and heavier.
   2. Cold formed steel C-shaped joists.
   3. Cold formed steel ceiling joists.
   4. Cold formed steel stud header wall framing and bracing supported from roof structure.
   5. Cold formed deep leg track (capture track) for interior nonload-bearing steel stud partitions.

B. Related Sections:
   1. Section 06100 - Rough Carpentry: Wood furring strips, plywood, and blocking.
   2. Section 09250 - Gypsum Board: Non-load bearing steel stud partition framing 20 gage and lighter and gypsum board attached to cold formed metal framing.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. American Iron and Steel Institute (AISI):
   a. North American Specification for the Design of Cold-Formed Steel Structural Members.
   b. Standard for Cold-Formed Steel Framing

C. ASTM International (ASTM):
   a. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   b. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   c. ASTM A 1003 - Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members
   d. ASTM C 954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in (2.84 mm) in Thickness.
   e. ASTM C 1007 - Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
   f. ASTM C 1513 - Steel Tapping Screws for Cold-Formed Steel Framing Connections.

D. American Welding Society (AWS):
   a. AWS D1.3 - Structural Welding Code - Steel Sheet.

E. Gypsum Association (GA):
   a. GA-216 - Application and Finishing of Gypsum Board.

F. Steel Structures Painting Council (SSPC):
   a. SSPC-Paint 20 - Zinc-Rich Coating Type I Inorganic And Type II Organic.

G. Steel Stud Manufactures Association (SSMA):
   a. SSMA Product Technical Information.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in the installation of cold formed metal framing components with minimum five years documented experience.

B. Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

C. Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

D. Qualifications for Welding Work: Qualify welding operators in accordance with Standard Qualification Procedures as required by AWS D1.1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect products.

B. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

C. Store and protect with waterproof covering; ventilate to avoid condensation.

D. Where framing is stored outdoors, stack materials off ground, supported on level platform, fully protected from weather.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with AISI North American Specification for the Design of Cold-Formed Steel Structural Members and ANSI Standard for Cold-Formed Steel Framing.

B. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, Grade: ST33H (33 ksi) unless otherwise indicated, Coating G60.

C. Material Thickness: Gage shown on the drawings shall have the following minimum base metal thickness.
   1. 20 gage: 33 mils
   2. 18 gage: 43 mils
   3. 16 gage: 53 mils

D. Interior and Exterior Load-Bearing Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, depth, flange width, and gage as indicated on Drawings.

a. Interior and Exterior Load-Bearing Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated,with stiffened flanges.

E. Partition Floor Tracks and Runners: Galvanized sheet steel, C-shaped; same depth and gage as studs; tight fit; solid web.

F. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.

G. Deflection (Capture) Track: Deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth as shown to contain studs while allowing free vertical movement, with flanges or legs as shown designed to support horizontal and lateral loads. Provide fasteners as

indicated on Drawings.

1. Contractor's Option: Manufacturer's standard double or single deflection track as follows:
   a. VertiClip or VertiTrack by The Steel Network, Raleigh, NC (888) 474-4876. If this option is used, track may be 20 guage for all stud sizes.
   b. FastTop Clip by Dietrich Metal Framing, Pittsburg, PA (412) 281-2805.
   c. SLP-TRK by Brady Innovations as distributed by Dietrich Metal Framing.

H. Wall Furring and Partition Bracing: Galvanized sheet steel.
   1. Cold-Rolled Channels: 3/4 inch x 1/2 inch and 1-1/2 inch x 17/32 inch or as shown on the drawings.
   2. Clip Angles: 2 inches x 2 inches x 16 gage x 1/4 inch less than stud width or
      a. Bridge Clip by The Steel Network.
      b. EasyClip U-Series Clip Angles 1-1/2" x 1-1/2" x 16 gage x 1/4 inch less than stud width by Dietrich Metal Framing.
   3. Contractor's Option: In leiu of cold rolled channels and clip angles for horizontal bridging, provide one of the following:
      a. Bridge Bar by the Steel Network.
      b. TradeReady Spazzer 5400 or 9200 bridging and spacing bar by Dietrich Metal Framing.

I. Framing Attachment Angles: Galvanized sheet steel, size, shape and configuration as indicated on Drawings, 14 gage, unless indicated otherwise on Drawings.
   1. Contractor's Option: Contact Dietrich Clip Express (330) 372-5564 for alternative selections.

J. Ceiling Joists and Runners: Galvanized sheet steel, C-shaped.

K. Flat Metal Straps and Plates: Galvanized sheet steel, gage, shape, and configuration as indicated on Drawings.
   1. Contractor's Option: In leiu of 2-inch continuous metal strap at capture tracks, Contractor may provide one of the following:
      a. Bridge Bar by The Steel Network.
      b. TradeReady Spazzer 5400 bridging and spacing bar by Dietrich Metal Framing

2.2 FASTENERS

A. 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.

B. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

C. Framing to Framing: ASTM C 1513; 5/8 inch Type S-12 low-profile head corrosion-resistant self-drilling self-tapping steel screws.

D. Framing to Attachment Angle Fasteners: #12 diameter pan head corrosion-resistant self-drilling self-tapping steel screws.

E. Wall Floor Track Anchorage Device: Carbon steel wedge type expansion anchor; minimum 3/8 inch diameter x minimum 1-1/2 inch embedment.
   1. Kwik Bolt KB II 38-3, by Hilti, Tulsa, OK (800) 879-8000.
   2. Thrubolt WS-3822, by ITW Ramset/Red Head, Wood Dale, IL (708) 350-1558.

F. Wall Furring to Concrete or Masonry Wall Fasteners: Hex head sleeve anchors; minimum 1/4

inch diameter x minimum 1-1/8 inch embedment.
1. Slv Anch HX 5/16X2-1/2, by Hilti or equal.
2. Dynabolt HN-1413, by ITW Ramset/Redhead or equal.

G. Furring Channel to Masonry or Concrete Surface Fasteners: Low velocity powder-actuated drive pins of size to suit application.

H. Welding Materials: AWS D1.3.

I. Wood Furring, Blocking, and Plywood, Attached to Framing Fasteners: Specified in Section 06100.

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

2.4 FINISHES

A. Galvanizing: G60 coating class.

B. Galvanizing Repair Paint: SSPC-Paint 20, Type II - organic.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing conditions and adjacent areas where products will be installed and verify that conditions conform to product manufacturer's requirements. Verify that building framing components are ready to receive work. Verify that rough-in utilities are in-place and located where required. Do not proceed until unsatisfactory conditions have been corrected.

B. Beginning of erection indicates acceptance of existing conditions.

3.2 INSTALLATION, GENERAL

A. Install cold-formed metal framing in accordance with AISI Standard for Cold-Formed Steel Framing and to manufacturer's written instructions unless more stringent requirements are shown or specified.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

3.3 INSTALLATION - STUD FRAMING

A. Install studs and fasteners in accordance with manufacturer's published instructions and, where gypsum board is attached to studs, install studs in accordance with GA-216 and ASTM C 1007.

B. Metal Stud Spacing: 16 inches on center, maximum, unless otherwise shown on the drawings.

C. Align stud web openings horizontally.

D. Construct corners using minimum three studs.

E. Place studs as indicated on Drawings, minimum 2 inches from abutting walls.

F. Erect studs one piece full length. Splicing of studs not permitted.

G. Erect studs, brace, and reinforce to develop full strength to meet design requirements.

H. Install headers at partition openings using load-bearing C-shaped joists.

I. Install framing between studs for attachment of mechanical and electrical items.

J. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.

K. Install intermediate studs above and below openings to match wall stud spacing.

L. Fasten studs adjacent to door and window frames, partition intersections, and corners to top and bottom runner flanges in double-stud fashion with metal lock fastener tools.
   1. Securely fasten studs to jamb and head anchor clips of door and borrowed-light frames.
   2. Place horizontally a cut-to-length section of runner with web-flange bent at each end, fasten with minimum one screw per flange.
   3. Position a cut-to-length stud (extending to top runner) at vertical panel joints over door frame header.

M. Install bridging for stud partitions over 8 feet high at mid-height with 1-1/2 inch rolled channels through studs and screw attach in place using clip angles. Lap channels by nesting one inside the other to a length of at least 8 inches and wire fasten together.

N. Blocking: Screw attach wood blocking between studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

O. Where optional framing products by the named manufacturers are specified in Part 2 above in leiu of conventional components specified, install in accordance with manufacturers recommendations.

P. Touch up field welds and damaged galvanized surfaces with primer.

Q. Fastening: Fasten framing in accordance with manufacturer's published instructions and schedule below unless indicated otherwise on Drawings.

FASTENERS	**MINIMUM CONNECTION**
Floor Track to Concrete	1 Anchor at 36 inches on center.
Partition Stud to Floor Track	1 Screw each side at flange.
Stud Web to Stud Web	2 Screws.
Plates and Straps to Studs	2 Screws.
Lateral Bracing to Partition Stud Using clip Angles	2 Screws to stud and 2 Screws to cold rolled channel.
Runner to Header	1 Screw at 16 inches on center, maximum 6 inches from each end.

Welded Connections	Indicated on Drawings.

3.4 INSTALLATION - JOIST FRAMING

A. Install joists and fasteners in accordance with manufacturer's published instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Place joists at locations and spacing as indicated on Drawings.

D. Touch-up field welds and damaged galvanized surfaces with primer.

E. Fastening: Indicated on Drawings.

3.5 INSTALLATION - CEILING JOISTS

A. Install joists and fasteners in accordance with manufacturer's published instructions and, where gypsum board is attached to joists, install joists in accordance with GA-216, and ASTM C 1007.

B. Ceiling Joist Spacing: 16 inches on center beginning from center of room unless otherwise shown on the drawings.

C. Install joists in direction of shortest span, parallel and level, with lateral bracing and bridging.

D. Install joists in one piece full length. Splicing of joists not permitted.

E. Install perimeter joist runner track sized to match joists. Attach joist runner track to wall framing with minimum 2 screws per stud and at corners and ends.

F. Attach joist ends to joist runner tracks with minimum 1 screw each side at each flange.

G. Install bridging at 48 inches on center beginning from center of room with 1-1/2 inch rolled channels screw attached to joists.

3.6 INSTALLATION - FURRING

A. Furring Channels: Attach vertically spaced at maximum 16 inches on center, unless otherwise shown on the drawings, to masonry and concrete surfaces with specified powder driven fasteners staggered 24 inches on center on opposite flanges.

B. Wall Furring:
   1. Secure top and bottom runners to structure.
   2. Space metal furring at maximum 16 inches on center unless otherwise shown on the drawings.

3.7 CONSTRUCTION

A. Interface with Other Work:
   1. Coordinate erection of studs with hollow metal door frames.
   2. Coordinate installation of anchors, supports, and blocking for mechanical, electrical, and building accessory items installed within framing.

B. Perform field welding in accordance with AWS D1.3.

3.8 QUALITY ASSURANCE TESTING AND INSPECTION

A. Engage the services of an independent testing agency to perform the following inspections for field quality control.

B. Welding (General):
   1. Prior to start of fabrication, determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
   2. Verify qualifications of all welders as AWS certified.
   3. Verify proposed welding procedures and materials.
   4. Verify adequate preparation of faying surfaces.
   5. Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required.

C. Welding (Field):
   1. Cold Formed Metal Framing Welds: Visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element.
   2. Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.

D. Miscellaneous Mechanical Fasteners: Visually inspect specified size, spacing, embedment, and location that are part of the building structural system.

E. Submittal Verification: Verify mill test reports and other submitted documentation for compliance with contract documents.

F. Material Verification: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:
   1. Bolts
   2. Electrodes
   3. Mechanical fasteners

G. Verification of Detail Compatibility:
   1. Inspect on a periodic basis:
   2. Review project documents affecting integrity of the structure including contract documents and approved shop drawings.
   3. Visit site at intervals appropriate to the stage of construction to perform review of the structure and visually confirm general compliance with the contract documents.
   4. Inspect the following to verify that member orientation, configuration, type, and size comply with details indicated on the contract documents and approved shop drawings:
      a. Bracing and stiffening members.
      b. Proper applications of joint details at connections for structural members.
      c. Other work critical to the integrity of the building structure.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following metal fabrications:
   1. Miscellaneous framing and supports for the following:
      a. Applications where framing and supports are not specified in other sections.
   2. Miscellaneous steel trim, including the following:
      a. Steel angle corner guards.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."
   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

   1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface

blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36 (ASTM A 36M).

C. Rolled Steel Floor Plates: ASTM A 786 (ASTM A 786M).

D. Steel Tubing: Product type (manufacturing method) and as follows:
   1. Cold-Formed Steel Tubing: ASTM A 500.
   2. Hot-Formed Steel Tubing: ASTM A 501.
      a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

E. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
   1. Black finish, unless otherwise indicated.
   2. Galvanized finish for exterior installations and where indicated.

F. Gray-Iron Castings: ASTM A 48, Class 30.

G. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27 (ASTM A 27M) cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

I. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property

Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

F. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
   2. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Products: Subject to compliance with requirements, provide one of the following:

   1. Nonshrink, Nonmetallic Grouts:
      a. B-6 Construction Grout; W. R. Bonsal Co.
      b. Diamond-Crete Grout; Concrete Service Materials Co.
      c. Supreme; Cormix Construction Chemicals.
      d. Sure-grip High Performance Grout; Dayton Superior Corp.
      e. Euco N-S Grout; Euclid Chemical Co.
      f. Five Star Grout; Five Star Products.
      g. Vibropruf #11; Lambert Corp.
      h. Crystex; L & M Construction Chemicals, Inc.
      i. Masterflow 928 and 713; Master Builders Technologies, Inc.
      j. Sealtight 588 Grout; W. R. Meadows, Inc.
      k. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.
      l. Kemset; The Spray-Cure Company.

2.5 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
   1. Temperature Change (Range): 100 deg F (55.5 deg C).

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.6 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.7 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for

openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of 1 inch per foot (85 mm per m) of clear span but not less than 8 inches (200 mm) bearing at each side of openings, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
      a. Except as otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

C. Galvanize miscellaneous framing and supports in the following locations:
   1. Interior locations where indicated.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices wherever possible.

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches (150 mm) from each end, 6 inches (150 mm) from corners, and 24 inches (600 mm) o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.10 STRUCTURAL STEEL DOOR FRAMES

A. Fabricate steel door frames from structural shapes and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel bar stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches (250 mm) o.c. Reinforce frames and drill and tap as required to accept finish hardware.

B. Provide steel strap anchors for securing door frames into adjoining concrete or masonry, using 1/8-by-2-inch (3-by-50-mm) straps of the length required for a minimum 8-inch (200-mm) embedment, unless otherwise indicated. Weld anchors to frame jambs no more than 12 inches

(300 mm) from both bottom and head of frame and space anchors not more than 30 inches (750 mm) apart.

C. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

D. Galvanize frames and anchors in the following locations:
   1. Exterior locations.
   2. Interior locations where indicated.

2.11 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

B. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:
   1. ASTM A 153 for galvanizing iron and steel hardware.
   2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
   1. Exteriors (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
   2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.3 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
   1. Use nonshrink, nonmetallic grout in all locations, unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Wood furring, grounds, nailers, and blocking.

1.3 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

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 for the following products:

1. Joists or framing members.
2. Metal framing anchors.
3. Construction adhesives.

C. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

D. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other

requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

E. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated. Submittal of reports to comply with Division 1 sections.

F. Warranty of chemical treatment manufacturer for each type of treatment.

G. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Metal framing anchors.
2. Power-driven fasteners.
3. Fire-retardant-treated wood.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

C. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover, dry and elevated above surface on which they are stored. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Compliance: Manufacturers used for this project shall comply with

provisions of the American Recovery and Reinvestment Act of 2009.

B. 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:

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wood-Preservative-Treated Materials:

   a. Baxter: J. H. Baxter Co.
   b. Chemical Specialties, Inc.
   c. Continental Wood Preservers, Inc.
   d. Hickson Corp.
   e. Hoover Treated Wood Products, Inc.
   f. Osmose Wood Preserving, Inc.
   g. Or approved equal

2. Fire-Retardant-Treated Materials, Exterior Type:

   a. American Wood Treaters, Inc.
   b. Hoover Treated Wood Products, Inc.
   c. Trus Joist MacMillan.
   d. Or approved equal.

3. Metal Framing Anchors:

   a. Cleveland Steel Specialty Co.
   b. Harlen Metal Products, Inc.
   c. Silver Metal Products, Inc.
   d. Simpson Strong-Tie Company, Inc.
   e. Southeastern Metals Manufacturing Co., Inc.
   f. Or approved equal

2.2 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's (American Lumber Standards Committee) Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority (Canadian).

3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

1. Provide dressed lumber, S4S, unless otherwise indicated.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

3. Wood framing members less than 18 inches (460 mm) above grade.
4. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.

B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
3. Contact with treated wood does not promote corrosion of metal fasteners.

C. Exterior Type: Use for exterior locations and where required by code.

D. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

2.5 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs (non-grain-raising) of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 (2009) or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.
2. Published requirements of metal framing anchor manufacturer.

4. "Table 2304.9.1--Fastening Schedule," of the International Building Code.

F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite

side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

G. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

H. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

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 work of this section.

1.2 DESCRIPTION OF WORK

A. Definition: finish carpentry includes carpentry work which is exposed to view, is non-structural, and which is not specified as part of Architectural Woodwork.

1.3 QUALITY ASSURANCE

A. Factory mark each piece of lumber and plywood with type, grade, mill and grading agency identification, except omit marking form surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.

1.4 SUBMITTALS

A. Samples: Submit samples for each species and cut or pattern of finish carpentry.

B. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storage, installation and finishing treated materials.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver finish carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.6 JOB CONDITIONS

A. Maintain temperature and humidity in installation area required to maintain moisture content of installed finish carpentry with a 1.0% tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and require temperature and humidity conditions.

PART 2 - PRODUCTS

2.1 WOOD PRODUCT QUALITY STANDARDS

A. Softwood Lumber Standards: Comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

B. Plywood Standard: Comply with PS 1/ANSI A199.1.

C. Hardwood Lumber Standard: Comply with National Hardwood Lumber Association (NHLA) rules.

D. Hardwood Plywood Standard: Comply with PS 51.

E. Woodworking Standard: Where indicated for a specific product comply with specified provision of the following:
1. Architectural Woodwork Institute (AWI) "Quality Standards".

2.2 MATERIALS

A. General: Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and patterns as shown, unless otherwise indicated.

B. Moisture Content of Softwood Lumber: Provide seasoned (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

C. Moisture Content of Hardwood Lumber: Provide kiln-dried (KD) lumber having a moisture content form time of manufacture until time of installation within the ranges required in the referenced woodworking standard.

D. Lumber for Transparent Finish (Stained or Clear): Use pieces made of solid lumber stock.

E. Lumber for Painted Finish: Use pieces of lumber made of solid lumber stock.

2.3 INTERIOR FINISH CARPENTRY

A. WM/Series Wood Molding Patterns: For stock molding patterns graded under Wood Molding and Millwork Producer Industry WM 4, provide the following grade based on finish indicated and fabricated from any Western softwood species graded and inspected by WWPA.

B. Hardwood Plywood Stock Panels: Provide manufacturer's stock hardwood plywood panels complying with applicable requirements of PS 51 for species and grade of face veneers and backing, adhesive, construction, thickness, panel size, and finish.
2. Face Veneer Species: As selected.
3. Grade: Premium.
4. Backing Veneer Species: Any hardwood compatible with face species.
5. Construction: Veneer core.
6. No. of Plies: 7.
7. Thickness: 3/4.
8. Panel Size: As selected or shown.
9. Plywood Type (Water Resistant Capability): Type II (Interior).]
10. Face Pattern: Plain (no grooves) with veneer edge matched within each panel face to comply with type of match required by referenced product standard.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide nails, screws and other anchoring devices of the type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications.

2.5 WOOD TREATMENT

A. Preservative Treatment (Trt-Wd): Following basic fabrication provide 3 minute dip treatment of finish carpentry items indicated to receive preservative treatment in 5% solution of pentachlorophenol, with vehicle which will not interfere with finish application and will produce minimum effect upon appearance. Apply brush coat on surfaces cut after treatment.

B. Fire Retardant Treated Wood (FRTW): Where wood is indicated as "FRTW", provide materials complying with applicable standards for pressure impregnation with fire retardant chemicals and with following requirements.
   1. AWPA Standard for Lumber: AWPA C 20 except as otherwise indicated.
   2. AWPA Standard for Plywood: AWPA C 27 except as otherwise indicated.
   3. Surface Burning Characteristics: Provide materials with surface burning characteristics not exceeding those indicated below when tested in accordance with ASTM E 84 for not less than standard time period (10 minutes).
      a. Flame Spread: 25.
   4. For FRTW wood used in interior application not exposed to relative humidities in excess of 92% use treatment chemicals with reduced hygroscopicity which are non-corrosive to metal fasteners, are non-blooming and permit use of transparent oilbased finishes.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) "Dricon", Koppers Company, Inc.
         2) "Flameproof LHC", Osmose Wood Preserving Co. of America, Inc.
         3) "Protex", Hoover Universal Wood Preserving Division.
   5. Kiln-dry wood after treatment to a maximum moisture content of 15% for plywood, 19% for lumber.
   6. Inspect each piece of lumber and plywood or each unit of finish carpentry after drying; do not use twisted, warped, bowed or otherwise damaged or defective wood.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.

B. Backprime lumber for painted finish exposed on the exterior or, where indicated, to moisture and high relative humidities on the interior. Comply with requirements of sections on painting within Division 9 for primers and their application.

3.2 INSTALLATION

A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes or patterns.

B. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8.0" for plumb and level countertops; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.

C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

E. Hardwood Plywood Paneling: Where grain character or color variations are noticeable, select and arrange panels on each wall for best match of adjacent panels. Install with uniform tight joints between panels.
   1. Attach panels to supports with panel adhesive and temporary bracing or fasteners, plus nailing where covered by moldings (if any), in accordance with manufacturer's instructions for concealed fastener installation.

F. Prefinished Hardwood Paneling, Board Type: Install in accordance with manufacturer's instructions for concealed nailing. Arrange in random width pattern suggested by manufacturer, unless boards are of uniform width. Stagger end joints in random pattern for best visual effect (uniformly distributed on each wall). Install with uniform joints, with only tongued and grooved or end matched joints within each field of paneling.

3.3 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.

C. Refer to Division 9 sections for final finishing of installed finish carpentry work.

D. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plastic Laminate Casework.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. American National Standards Institute (ANSI):
   1. ANSI A208.1 - Particleboard.
   2. ANSI A208.2 - Medium Density Fiberboard For Interior Use.

C. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA):
   1. ANSI/BHMA 156.9 - Cabinet Hardware.
   2. ANSI/BHMA 156.11 - Cabinet Locks.
   3. ANSI/BHMA 156.18 - Materials & Finishes.

D. Architectural Woodwork Institute (AWI) / Architectural Woodwork Manufacturers Association of Canada (AWMAC) / Woodwork Institute (WI) - Joint Publication:
   1. AWI/AWMAC/WI - Architectural Woodwork Standards.

E. American Plywood Association (APA): APA - Grades & Specifications.

F. National Electrical Manufacturer's Association (NEMA):
   1. NEMA LD3 - High-Pressure Decorative Laminates.

1.3 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, store, and protect products in compliance with the requirements of Section 01600.

B. Inspect materials delivered and reject those not qualifying with requirements, those damaged in transit, or those that appear otherwise unsatisfactory.

C. Schedule delivery of items to installation areas that are in proper condition to receive them. Place items neatly and systematically to avoid damage, store in clean, dry, enclosed, and secure storage area.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install architectural woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 LAMINATE MATERIALS

A. High Pressure Laminate (HPL): NEMA LD3: Color, pattern, and finish as indicated in this Section. Exposed Horizontal and Vertical Surfaces: GP-50. Postformed Surfaces: PF-42. Provide HPL products as manufactured by the following as specified in the Color/Pattern Schedule below:
   1. Formica Corporation, Indianapolis, IN, Megan Shaughnessy, (513) 786-3039.
   2. Wilsonart, Temple, TX, Mark Kieckhafer, (254) 207-2381.
   3. Nevamar Decorative Surfaces, Hampton, SC, (800) 638-4380.
   4. Panolam Industries, Shelton, CT (800) 241-4915.
   5. Pionite Decorative Surfaces, Auburn, ME (800) 746-6483.

B. Thermofused Melamine Panel (TFM): Particleboard or medium density fiberboard (MDF) finished with thermally fused, melamine-impregnated decorative paper. Provide products by one of the following manufacturers:
   1. Panolam Industries.
   2. Funder America, Inc., Mocksville, NC (336) 751-3501.
   3. Roseburg Forest Products, Roseburg, OR (800) 245-1115.

2.2 ACCESSORIES

A. Adhesives: Low VOC adhesive, as recommended by laminate manufacturer and suitable for shop or field application.
   1. Toxicity / IEQ:
      a. Comply with applicable regulations regarding toxic and hazardous materials.
      b. Comply with Green Seal Standard GS-36 for commercial aerosol adhesives.
      c. Comply with California's South Coast Air Quality Management District (SCAQMD) Rule No. 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur. In areas where freeze/thaw conditions exist or direct exposure to moisture can occur, comply with California's Bay Area AQMD Regulation 8, Rule 51 for containers larger than 16 oz. and with California Air Resource Board (CARB) for containers 16 oz. or less.
   2. Provide one of the following products or equivalent as recommended by laminate manufacturer.
      a. Wilsonart 3000 Adhesive Series. (Do not use for metallic surfaces)
      b. Sta'-Put SP80.
      c. Titebond Neoprene Plus.

B. Fasteners: Unless otherwise recommended by manufacturer, use size and type to suit application. Metal Edge Trim:
   1. Manufacturers:
      a. Macklanburg-Duncan, Oklahoma City, OK (800) 654-8454.

b. Outwater Plastics Industries, Inc.
   1) East Coast: Bogota, NJ (800) 631-8375.
   2) West Coast: Phoenix, AZ (800) 248-2067.
c. Loxcreen, West Columbia, SC (817) 640-4456
d. Stylmark, Minneapolis, MN (800) 328-2495.
e. Alternate Manufacturers: As approved by the Owner's Construction Manager.

2. Description: Extruded aluminum shapes, smooth surface, anodized finish. Size and type to suit application.
   a. 3/4 inch x 3/4 inch as indicated on Drawings.
   b. 1-1/2 inch x 1-1/2 inch as indicated on Drawings.

2.3 PANEL PRODUCT

A. Medium Density Fiberboard (MDF), ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde resin.

B. Particleboard, density 45 lb., ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde resin.

C. Provide MDF or Particleboard specified above as manufactured by one of the following:
   1. Flakeboard Company.
   2. Homasote.
   3. Panel Source International.
   4. Sierra Pine.
   5. Roseburg Forest Products.
   6. Temple Inland.

2.4 COLOR/PATTERN SCHEDULE

A. Provide color as selected by Architect form manufacture's standard selection.

2.5 CABINET HARDWARE AND ACCESSORIES

A. Provide cabinet hardware to match existing style and finsh.

B. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

PART 3 - EXECUTION

3.1 PLASTIC LAMINATE CASEWORK

A. Anchor plastic laminate to base and wall cabinets securely to base units.

B. Install laminate with directional pattern or grain oriented vertically.

C. Provide extruded aluminum trim at exposed vertical and horizontal edges of high pressure laminate (HPL).

D. Install woodgrain laminate with grain oriented vertically.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cabinet Hardware and Accessories.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. American National Standards (ANSI):
   1. ANSI A208.1 - Particleboard
   2. ANSI A208.2 - Medium Density Fiberboard For Interior Use

C. American Woodworking Institute (AWI): AWI – Architectural Woodwork Quality Standards.

D. American Plywood Association (APA): APA - Grades & Specifications.

E. National Electrical Manufacturer's Association (NEMA)

1.3 DELIVERY, STORAGE AND HANDLING

A. Inspect materials delivered and reject those not qualifying with requirements, those damaged in transit, or those that appear otherwise unsatisfactory.

B. Schedule delivery of items to installation areas that are in proper condition to receive them. Place items neatly and systematically to avoid damage, store in clean, dry, enclosed, and secure storage area.

PART 2 - PRODUCTS

2.1 CABINET HARDWARE AND ACCESSORIES

A. Provide cabinet hardware as specified by the following manufacturers:
   1. Knape & Vogt (KV), 2700 Oak Industrial Drive NE, Grand Rapids, MI 49505, (616) 459-3311.
   2. Hafele, 3901 Cheyenne Drive, Archdale, NC 27263, (800) 423-3531.
   3. Ives, 2720 Tobey Drive, Indianapolis, IN 46219, (877) 613-8766.
   4. Rockford Process Control, Inc., 2020 Seventh Street, Rockford, IL 61104, (815) 966-2000.
   5. Blum, Inc., 7733 Old Plank Road, Stanley, NC 28164, (800) 438-6788.
   6. Grass, 1202 Highway 66 South, Kernersville, NC 27284, (336) 423-5226.
   7. Approved equal.

B. Cabinet Hardware:
   1. Wire Drawer and Door Pulls: ANSI/BHMA A156.9, B02011, solid metal, 4 inches long, 5/16 inch in diameter.

2. Drawer Slides: ANSI/BHMA A156.9, B05091. Slides shall include an integral positive stop to avoid accidental drawer removal.
   a. Box Drawer Slides: Grade 1HD-100; side mounted; full-extension type; zinc-plated steel ball-bearing slides for drawers not more than 6 inches high and 24 inches wide.
   b. File Drawer Slides: Grade 1HD-100; side mounted; full-extension type; zinc-plated steel ball-bearing slides for drawers more than 6 inches high or 24 inches wide.
   c. Pencil Drawer Slides: Grade 1; side mounted; full-extension type; zinc-plated steel or epoxy-coated steel with polymer rollers for drawers not more than 3 inches high and 24 inches wide.
3. Drawer Locks: ANSI/BHMA A156.11, E07041.
4. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
   a. Place rests in drilled 5mm diameter holes, spaced vertically at 1 1/4” centers. Minimum of four rests per shelf.
   b. Shelf span per AWI/AWMAC/WI standards.
5. Door Locks: ANSI/BHMA A156.11, E07121.
6. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 100 degrees of opening, self-closing.

C. Cabinet Accessories: Provide cabinet accessories by the manufacturers specified below or equivalent products of same function, style, material, and finish from manufacturers specified above.
   1. Grommets:
      a. Doug Mockett & Company: EDP-3 Round Plastic Grommets, removable caps with flip-down tabs. LO-2 Oval.
         1) Size as noted on Drawings.
         2) Color as noted on Drawings.
      b. Hardware Concepts: 6249.
         1) Size as noted on Drawings.
         2) Color as noted on Drawings.
      c. Bainbridge Manufacturing: 2 1/2 inch Round 1031BK-52.
   2. Adjustable Shelf Pin: Hafele #282.40.708 5mm.

D. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated, except where indicated otherwise.
   1. Satin Chromium Plated: BHMA 626 for brass base; BHMA 652 for steel base; BHMA 682 for zinc base.

E. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

PART 3 - EXECUTION

3.1 CASEWORK

A. Install woodwork plumb, level, and straight without distortion; use concealed shims. Scribe and cut woodwork to fit adjoining work. Anchor woodwork items to nailers or blocking or directly to substrate using concealed fasteners.

B. Casework: Provide well-fitting and smooth operating doors and drawers.

C. Countertops: Anchor countertops securely to base units.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

A. Work of this sect on includes:
   1. Classroom countertops.

1.2 REFERENCES:

A. Applicable standards: Standards of the following, as referenced herein~
   1. American National Standards Institute (ANSI)
   2. ASTM International (ASTM)

1.3 SUBMITTALS:

A. Shop drawings: Indicate dimensions, component sizes, fabrication details attachment provisions and coordination requirements with adjacent work.

B. Samples: Submit minimum 6” by 6” samples. Indicate full range of color and pattern variation. Approved samples will be retained as a standard for work.

C. Product data: Indicate product description, fabrication information and compliance with specified performance requirement.

D. Maintenance data: Submit manufacturer’s care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Deliver no components to project site until areas are ready for installation. Store indoors.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.5 WARRANTY:

A. Provide manufacturer’s warranty against defects in materials. Warranty shall provide for replacement material and labor for a period of ten years, beginning at Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOLID SURFACING MATERIAL:

A. Acceptable products:
   1. Basis of design: DuPont Corian - Zodiaq
   2. Avonite, Inc., Formastone.
   3. Wilsonart International, Gibralter.

B. Material: Cast, 100% acrylic resin, solid, structural surfacing material.
   1. Material shall be through—patterned and homogeneous. No coated materials nor non—homogeneous materials allowed.
   2. Hardness: Minimum 55 Barcol hardness, tested in accord with ASTM D2583—95(2001), or minimum 90 Rockwell hardness, tested in accord with ASTM D785—98.
   3. Tensile strength: Minimum 4,200 psi, tested in accord with ASTM D638—0l.
   4. Abrasion resistance: Maximum 0.4 grams at 1,000 cycles, tested in accord with ASTM C501—84 (2002)
   5. Fire resistance: Flame spread and smoke developed meeting ASTM E84—04, Class I rating.
   6. Color stability: No change in 200 hours, tested in accord with NEMA LD3.
   7. Water absorption: Maximum 0.04% for 3/4", 0.06% for 1/2", 0.08% for 1/4", tested in accord with ASTM D570—98.
   8. Fungal resistance: •No attack when tested in accord with ASTM G21—96(2002).
   9. Bacterial resistance: No attack when tested in accord with ASTM G22—76(1996).
   10. Impact resistance: No fracture when tested in accord with NEMA LD 3—3.3, 36" for 1/4", 144" for 1/2", 204" for 3/4"drop.
   11. Superficial damage to a depth of 0.10" shall be repairable by sanding and polishing.

2.2 CHARACTERISTICS:

A. Colors: To be selected from a full range of manufacturers' standard colors.

2.3 ACCESSORY PRODUCTS:

A. Joint adhesive: Manufacturer's standard, two—part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.

B. Sealant: Manufacturer's standard mildew—resistant, FDA/UL recognized silicone sealant in color matching surfacing or clear formulations.

C. Sink/bowl mounting hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of undermount sinks/bowls.

2.4 FABRICATION:

A. Factory—fabricate components to greatest extent practicable, to sizes and shapes indicated, in accord with approved shop drawings.

B. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints and without voids. Attach a 2" wide reinforcing strip of solid surfacing under each joint.

C. Provide factory cutouts for plumbing fittings and bath accessories as indicated.

D. Rout and finish component edges to a smooth, uniform finish. Rout cutouts and sand edges smooth. Machine radii and contours to template. Repair or reject defective and inaccurate work.

E. Edge treatment for tops: As indicated on drawings.

F. Cold surfaces:

1. Make cutouts to template furnished by cold appliance manufacturer.
2. Reinforce joints and cutouts in accord with surfacing manufacturer's product data.
3. Provide installation between surfacing and adjacent cold appliances.
4. Thermally isolate hot and cold appliances.

2.5 SOURCE QUALITY CONTROL:

A. Allowable tolerances:
   1. Variation in component size: ±1/8".
   2. Location of openings: ±1/8" from indicated location.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accord with approved shop drawings and product data.

B. Form field joints using specified adhesive, with joints inconspicuous in finished work.

C. Install top mount sinks/bowls to countertops using specified adhesives and color—matched silicone sealants.

D. Install under mount sinks/bowls to countertops per manufacturers written instructions.

E. Provide back and end splashes as indicated. Adhere to countertops using specified color—matched silicone adhesive.

F. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained components.

G. Make plumbing connections to sinks in accord with Mechanical Division of the Specifications.

3.2 PROTECTION:

A. Protect surfaces from damage until Date of Substantial Completion. Repair or replace damaged work which cannot be repaired.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Batt Insulation.

B. Related Requirements:
   1. Section 09250 - Gypsum Board: Metal furring.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. ASTM International (ASTM):
   1. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM C 665 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
   3. ASTM E 136 - Behavior of Materials in a Vertical Tube furnace at 750 C.

1.3 DEFINITIONS

A. Concealed Insulation: Insulation concealed within framing system, both faces protected by finish material.

B. Exposed Insulation: Insulation exposed within framing system, one or both faces unprotected.

1.4 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, store, and protect products in compliance with the requirements of Section 01600 and manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products from one of the following manufacturers as specified in the Materials paragraph below:
   1. CertainTeed Corporation, Valley Forge, PA (800) 523-7844.
   2. Guardian Fiberglass Incorporated, Albion, MI (800) 748-0035.
   3. Johns Manville Insulations, Denver, CO (877) 766-3295.
   4. Owens-Corning, Toledo, OH (800) 438-7465.

2.2 REGULATORY REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods specified. Identify materials with appropriate markings of applicable testing and inspecting agency.

2.3 MATERIALS

A. Batt Insulation: ASTM C 665 mineral fiber blanket insulation.
   1. Sound Attenuation Insulation (Sound Batts): Unfaced glass fiber batt insulation as specified above.
   2. Provide batt insulation by one of the following manufacturers:
      a) CertainTeed Corporation.
      b) Guardian Fiberglass, Inc.
      c) Johns Manville.
      d) Owens Corning.

B. Substitutions: Comply with the requirements of Section 01600.

2.4 ACCESSORIES

A. Tape: Polyethylene or polyester self-adhering type; two inches wide.

PART 3 - EXECUTION

3.1 PREPARATION

A. Batt Insulation:
   1. Verify adjacent materials are dry and ready to receive installation.
   2. Verify mechanical and electrical services within walls have been installed and tested.

3.2 INSTALLATION - BATT INSULATION

A. Install batt insulation in accordance with manufacturer's instructions, without gaps or voids.

B. Trim insulation neatly to fit spaces. Use batts free of damage. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

C. Install insulation with factory applied membrane facing warm side in winter of building spaces. Lap ends and side flanges of membrane. Attach insulation in place to framing; tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.

3.3 SCHEDULES

A. Provide insulation types as scheduled below and as indicated on Drawings.

CONDITION	TYPE OF INSULATION	THICKNESS
Ceiling	Faced Batt Insulation	6 inches (R=19)
Interior Partitions	Unfaced Sound Batt Insulation	3-1/2 inches or 6 inches as Shown.

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 joint sealants for the following locations:
   1. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
      a. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      b. Other joints as indicated.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data from manufacturers for each joint sealant product required.
   1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch (13-mm) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

E. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating 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 materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
   2. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4 deg C).
   3. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide color of exposed joint sealants to comply with the following:
   1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
   1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

B. Products: Subject to compliance with requirements, provide one of the following products: DOW Silicone Sealant 795.

2.3 LATEX JOINT SEALANTS

A. General: Provide manufacturer's standard one-part, non-sag, mildew-resistant, paintable latex sealant of formulation indicated that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.

B. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.

C. Silicone Emulsion Sealant: Provide product complying with ASTM C 834 and, except for weight loss measured per ASTM C 792, with ASTM C 920 that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.

D. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:
   1. Acrylic-Emulsion Sealant:
      a. "AC-20," Pecora Corp.
      b. "Sonolac," Sonneborn Building Products Div., ChemRex, Inc.
      c. "Tremco Acrylic Latex 834," Tremco, Inc.
   2. Silicone-Emulsion Sealant:
      a. "Trade Mate Paintable Glazing Sealant," Dow Corning Corp.

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   1. Open-cell polyurethane foam.
   2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.

3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf (40 kg/cu. m) and tensile strength of 35 psi (240 kPa) per ASTM D 1623, and with water absorption less than 0.02 g/cc per ASTM C 1083.
4. Any material indicated above.

C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing

optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.
4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   a. Do not leave gaps between ends of joint fillers.
   b. Do not stretch, twist, puncture, or tear joint fillers.
   c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
2. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
3. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at

locations indicated.

a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel doors and frames.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 08211 - Flush Wood Doors: for hollow-core and solid-core wood doors installed in steel frames.
   3. Section 08710 - Door Hardware: for door hardware and weather stripping.
   4. Section 09250 - Gypsum Board: for spot grouting frames in gypsum board partitions.
   6. Section 09900 - Painting: for field painting primed doors and frames.

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 type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.
   1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.4 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped 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. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Steel Doors and Frames:
   a. Ceco Door Products.
   b. Curries Co.
   c. Steelcraft.
   d. D & D
   e. Fleming
   f. Haberaham
   g. Republic Builders Products
   h. Tal-Kno

2.2 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569 (ASTM A 569M).

B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality, special killed.

C. Supports and Anchors: Fabricated from not less than 0.0478-inch- (1.2-mm-) thick steel sheet; 0.0516-inch- (1.3-mm-) thick galvanized steel where used with galvanized steel frames.

D. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 FRAMES

A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames as follows:
1. Fabricate frames with mitered or coped and continuously welded corners.
2. Fabricate frames for interior openings of 16 Gage steel sheet.
3. Form exterior frames from 14 Gage galvanized steel sheet.

B. Door Silencers: Except on weather stripped frames, drill stops to receive 3 silencers on strike

jambs of single-door frames and 2 silencers on heads of double-door frames.

2.4 FABRICATION

A. Fabricate steel door frame units to be rigid, neat in appearance, and free from defects, warp, or 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. Comply with ANSI/SDI 100 requirements.

B. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

C. Hardware Preparation: Prepare doors frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

D. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

C. Apply primers and organic finishes to doors and frames after fabrication.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Install fire-rated frames according to NFPA 80.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

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 the following:
   1. Solid core doors with wood veneer faces.
   2. Factory finishing of flush wood doors.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 6 Section "Finish Carpentry" for wood door frames.

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 type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.

C. Shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data.
   1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

D. Samples for initial selection in the form of color charts consisting of actual materials in small sections for the following:
   1. Faces of factory-finished doors with finish to match existing. Show the full range of colors available for stained finishes.

1.4 QUALITY ASSURANCE

A. Quality Standard: Comply with the following standard:
   1. NWWDA Quality Standard: I.S.1-A, "Architectural Wood Flush Doors," of the National Wood Window and Door Association.
   2. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.
   3. WIC Quality Standard: "Manual of Millwork" of the Woodwork Institute of California for grade of door, core, construction, finish, and other requirements.

      a. Provide WIC Certified Compliance Certificate indicating that doors meet requirements of grades specified.
      b. Provide WIC Certified Compliance Certificate for installation.

B. Fire-Rated Wood Doors: Provide wood doors that comply with NFPA 80; are identical in materials

and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.

C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.
   1. Comply with WIC Technical Bulletin 420-R for delivery, storage, and handling of doors.

B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

1.6 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards.
   1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
   2. Warranty shall be in effect during the following period of time after date of Substantial Completion.
      a. Solid Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:
   1. Solid Core Doors:
      a. Algoma Hardwoods Inc.
      b. Buell Door Co.

c. Eggers Industries, Architectural Door Division.
d. Fenestra Corporation.
e. Mohawk Flush Doors, Inc.
f. Weyerhauser Co.
g. Chappell Door
h. VT Industries

2.2 INTERIOR FLUSH WOOD DOORS

A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
1. Faces: White birch, plain sliced.
2. Grade: Premium.
3. Construction: 5 plies.
4. Core: Structural Composite lumber core as required to meet WDMA I.S.10.
5. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.

B. Fire-Rated Solid Core Doors: Comply with the following requirements:
1. Faces and Grade: Provide faces and grade to match non-fire-rated doors in same area of building, unless otherwise indicated.
2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated.
3. Blocking: Provide composite blocking designed to maintain fire resistance of door butt with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
   a. 5-inch (125-mm) top rail blocking.
   b. 5-inch (125-mm) bottom rail blocking.
   c. 5-by-18-inch (125-by-450-mm) lock blocks.
   d. 5-inch (125-mm) midrail blocking.
4. Edge Construction: Provide manufacturer's standard laminated-edge construction for improved screw-holding capability and split resistance as compared to edges composed of a single layer of treated lumber.

2.3 FABRICATION

A. Fabricate flush wood doors to comply with following requirements:
1. In sizes indicated for job-site fitting.
2. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels:
   a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.
3. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
   a. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
   b. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Louvers: Factory install louvers in prepared openings.

2.4 FACTORY FINISHING

A. General: Comply with referenced quality standard's requirements for factory finishing.

B. Finish wood doors at factory.

C. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.
1. Grade: Premium.
2. Finish: AWI System TR-6 catalyzed polyurethane.
3. Effect: Filled finish.
4. Sheen: Satin.
5. Stain: Color to be selected by Architect

PART 3-EXECUTION

3.1 EXAMINATION

A. Examine installed door frames prior to hanging door:
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation see Division 8 Section "Door Hardware."

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced quality standard and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch (3.2 mm) at jambs and heads, 1/16 inch (1.6 mm) per leaf at meeting stiles for pairs of doors, and 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch (6.4-mm) clearance from bottom of door to top of threshold.
2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
3. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
4. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

3.3 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.

B. Related Sections include the following:

1. Section 08110 - Steel Doors and Frames: for door silencers provided as part of the frame.
2. Section 08211 - Flush Wood Doors.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
1. Final replacement cores and keys to be installed by Owner.

1.3 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of door hardware indicated.

C. Samples: For exposed door hardware of each type indicated below, in specified finish, full size. Tag with full description for coordination with the Door Hardware Schedule. Submit samples before, or concurrent with, submission of the final Door Hardware Schedule.

1. Door Hardware: As follows:

a. Hinges.
b. Locks and latches.
c. Bolts.
d. Exit devices.
e. Cylinders and keys.
f. Operating trim.
g. Closers.
h. Stops and holders.

i. Protective trim.
j. Door gasketing.
k. Thresholds.
l. KeyScan Card Reader (see Door Schedule for locations)

2. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit the final Door Hardware Schedule after Samples, Product Data,

5. Coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

E. Keying Schedule: Prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

G. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

H. Warranties: Special warranties specified in this Section. Coordinate with Warranties of Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware 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. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards," as follows:

a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
b. Door Closers: Comply with the following maximum opening-force requirements indicated:

1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch (13 mm) high Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
c. Thresholds: Not more than 1/2 inch (13 mm) high.

D. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing 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.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

D. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 HINGES AND PIVOTS, GENERAL

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. Hinges:

a. Baldwin Hardware Corporation.
b. Bommer Industries, Inc.
c. Hager Companies.
d. McKinney Products Company; Div. of ESSEX Industries, Inc.
e. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.

B. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.
2. Template Hinge Dimensions: BHMA A156.7.

C. Quantity: Provide the following, unless otherwise indicated:
1. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).

D. Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

Maximum Door Size (inches)	Hinge Height (inches)	Metal Thickness (inches) Standard Weight	Heavy Weight
32 by 84 by 1-3/8	3-1/2	0.123	-
36 by 84 by 1-3/8	4	0.130	-

E. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

F. Hinge Applications: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard-weight hinges.

G. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
2. Interior Hinges: Brass, with stainless-steel pin body and brass protruding heads.
3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.

H. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

   a. Outswinging exterior doors.
2. Corners: Square 5/32-inch (4-mm) radius.

I. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors Finish screw heads to match surface of hinges.

2.2 HINGES

A. Antifriction-Bearing, Full-Mortise (Butt) Hinges: Heavy weight; BHMA Grade 1, with 4 ball bearings; button tips; nonrising removable pins; and base metal as follows:

1. Base Metal: Cast, forged, or extruded brass or bronze.

B. Plain-Bearing, Standard-Weight, Full-Mortise (Butt) Hinges: BHMA Grade 3, button tips, nonrising removable pins, and base metal as follows:

1. Base Metal: Cast, forged, or extruded brass or bronze.

2.3 LOCKS AND LATCHES, GENERAL

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. Mechanical Locks and Latches:
   a. Best Lock Corporation.
   b. Or approved equal.

B. Standards: Comply with the following:
1. Mortise Locks and Latches: ANSI/BHMA A156.13, Grade 1 Series 1000.
2. Cylindrical Locks: ANSI/BHMA A156.2, Grade 1 Series 4000.
3. Auxiliary Locks: BHMA A156.5, Grade 1
4. Exit Locks: BHMA A156.5.
5. Push button Locks: 5 button with key override, by American Locksets. Simplex L1000 series or approved equal.

C. Lock Trim: Comply with the following:

1. Lever: Wrought, forged, or cast.
2. Escutcheon (Rose): Wrought, forged, or cast.
3. Dummy Trim: Match lock trim and escutcheons.

D. Lock Functions: Function numbers or descriptions indicated in the Door Hardware Schedule comply with the following:
1. Mortise Locks: BHMA A156.13.
2. Cylindrical Locks: BHMA A156.2

E. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
1. Mortise Locks:
   a. 3/4-inch (19-mm) latchbolt throw.
   b. 1-inch (25-mm) deadbolt throw.
2. Cylindrical Locks: Provide deadlocking unless noted otherwise.
   a. 1/2-inch (13-mm) plain latchbolt throw.
   b. 1/2-inch (13-mm) deadlocking latchbolt throw.

F. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

2.4 DOOR BOLTS, GENERAL

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. Flush Bolts:

a. Adams Rite Manufacturing Co.
b. Glynn-Johnson; an Ingersoll-Rand Company.
c. Hager Companies.
d. Ives: H. B. Ives.

B. Standards: Comply with the following:
1. Manual Flush Bolts: BHMA A156.16.

2.5 EXIT DEVICES, GENERAL

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. Securitron Magnalock Corp.
2. Or approved equal

B. Standard: BHMA A156.3.

C. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Outside Trim: Lever with cylinder; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

2.6 EXIT DEVICES

A. Rim Exit Devices:

1. Securitron TSB

2.7 CYLINDERS AND KEYING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cylinders:
    a. Best Lock Corporation.
    b. Or approved equal.

B. Standards: Comply with the following:

1. Cylinders: BHMA A156.5.

C. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Seven.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

E. Construction Keying: Comply with the following:
1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
    a. Furnish permanent cores to Owner for installation.

F. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:
1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
2. Existing System: Master key or grand master key locks to Owner's existing system.

    a. Cylinders shall be master keyed.

G. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

    a. Notation: **"DO NOT DUPLICATE."**

    b. Quantity: In addition to one extra blank key for each lock, provide the following:

    c. Cylinder Change Keys: Three.
    d. Master Keys: Five.

H. Key Control System: BHMA Grade 1 system, including key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers. Contain system in metal cabinet with baked-enamel finish.
1. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.
2. Capacity: Able to hold keys for 150 percent of the number of locks.

2.8 STRIKES

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. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Cylindrical Locks and Latches: ANSI Strikes 1-1/4 x 4-7/8.
   3. Dustproof Strikes: BHMA A156.16.
   4. Electric Strikes:

C. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

D. Dustproof Strikes: BHMA Grade 1, complying with the following:

   1. Jamb Type: Polished wrought brass, with 3/4-inch- (19-mm-) diameter, spring-tension plunger.

2.9 ACCESSORIES FOR PAIRS OF DOORS, GENERAL

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. Astragals:

      a. Hager Companies.
      b. National Guard Products, Inc.
      c. Pemko Manufacturing Co., Inc.
      d. Reese Enterprises, Inc.
      e. Ultra Industries; a Macklanburg-Duncan Company.
      f. Zero International, Inc.

2.10 ACCESSORIES FOR PAIRS OF DOORS

A. Overlapping-with-Gasket Astragals: T-shaped metal, surface mounted on edge of door with screws; with integral gasket; and base metal as follows:

   1. Base Metal: Primed steel.
   2. Gasket Material: Polypropylene.

2.11 CLOSERS, GENERAL

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. Surface-Mounted Closers:

a. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc.
b. LCN Closers; an Ingersoll-Rand Company.
c. Norton Door Controls; Div. of Yale Security Inc.
d. Rixson-Firemark, Inc.; Div. of Yale Security Inc.
e. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
f. Yale Security Inc.; Div. of Williams Holdings.

B. Standards: Comply with the following:

1. Closers: BHMA A156.4.

C. Surface Closers: BHMA Grade 1.

2.12 CLOSERS

A. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in cover indicated; complying with the following:

1. Mounting: Hinge side, top jamb.
2. Type: Regular arm.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Cover Material: Aluminum.
5. Closing Power Adjustment: At least more than minimum tested value.

2.13 PROTECTIVE TRIM UNITS, GENERAL

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. Metal Protective Trim Units:
   a. Hiawatha, Inc.
   b. IPC Door and Wall Protection Systems, Inc.
   c. Ives: H. B. Ives.
   d. NT Quality Hardware; an Ingersoll-Rand Company.
   e. Pawling Corporation.
   f. Rockwood Manufacturing Company.

B. Standard: Comply with BHMA A156.6.

C. Materials: Fabricate protection plates from the following:
1. Bronze: 0.050 inch (1.3 mm) thick; beveled top and 2 sides.
   a. Color and Texture: As selected by Architect from manufacturer's full range.

D. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.

E. Furnish protection plates sized 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in schedule.

2.14 STOPS AND HOLDERS, GENERAL

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. Architectural Builders Hardware Mfg., Inc.
2. Glynn-Johnson; an Ingersoll-Rand Company.
3. Hager Companies.
4. Ives: H. B. Ives.
5. Yale Security Inc.; Div. of Williams Holdings.

B. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.
2. Combination Overhead Holders and Stops: BHMA A156.8.
3. Door Silencers: BHMA A156.16.

C. Combination Overhead Stops and Holders: BHMA Grade 1, unless Grade 2 is indicated.

D. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

2.15 STOPS AND HOLDERS

A. Lever-Type Door Holders: Polished cast brass, bronze, or aluminum; consisting of 4-inch- (102-mm-) long arm that swings up and remains in vertical position; with replaceable rubber tip; surface-screw application.

2.16 OVERHEAD STOPS AND HOLDERS

A. Overhead Surface-Mounted, Jointed-Arm Stops: Release by push and pull of door; control capable of being set in inactive position; with stop and shock absorber; for single-acting doors opening 110 degrees.

2.17 WALL BUMPERS

A. Wrought, finish to match lock trim.

B. Rubber

C. Concealed mounting.

2.18 DOOR GASKETING, GENERAL

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. Door Gasketing:

a. National Guard Products, Inc.
b. Pemko Manufacturing Co., Inc.
c. Reese Enterprises, Inc.
d. Sealeze Corporation.
e. Zero International, Inc.

2. Door Bottoms:

a. Hager Companies.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Reese Enterprises, Inc.
e. Zero International, Inc.

B. Standard: Comply with BHMA A156.22.

C. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

D. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10B or NFPA 252.

F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

G. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

H. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

2.19 DOOR GASKETING

A. Rigid, Housed Perimeter Gasketing: Gasket material held in place by metal housing; fastened to frame stop with screws.

1. Gasket Material: Polyurethane bulb.
2. Housing Material: Stainless steel.

B. Door Sweeps: Gasket material held in place by flat metal housing or flange; surface mounted to face of door with screws.

1. Gasket Material: Polyurethane.
2. Housing Material: Bronze.

C. Automatic Door Bottoms: Gasket material held in place by metal housing that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.

1. Gasket Material: Sponge neoprene Nylon brush.
2. Housing Material: Aluminum with 0.047-inch (1.2-mm) lead lining.
3. Mounting: Surface mounted on face of door.
4. Type: Low-closing-force type for doors required to meet accessibility requirements.

2.20 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Steel Machine or Wood Screws: For the following fire-rated applications:

   a. Mortise hinges to doors.
   b. Strike plates to frames.
   c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
   a. Closers to doors and frames.
   b. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.21 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
   1. Provide Architect with samples of Finishes for selection from standard .BHMA Designations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series, or ANSI/BHMA A156.115.

B. Wood Doors: Comply with DHI A115-W series, or ANSI/BHMA A156.115-W.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

   1. Standard Steel Doors and Frames:
      a. DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
      b. ANSI “Hardware Preparation in Steel Doors and Steel Frames.”
   2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
   3. Wood Doors:
      a. DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
      b. ANSI “Hardware Preparation in Wood Doors with Wood or Steel Frames.”

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SCHEDULE

A. Exposed finishes to match existing.

HW – 1
Door #'s: 101A, 101B, 101C, 102A, 102B, 105 and 106 - Office/ Classroom
(WD, Single)

3	Hinges (1 ½ pair)	Plain bearing, full mortise, standard weight
1	Lockset (Office Lock)	Cylindrical lock, Lock trim (accessible)
1	Closure w/hold open	
1	Silencer pack	

HW – 2
Door #'s: 101D, 102C – Storage
(WD, Single)

3	Hinges (1 ½ pair)	Plain bearing, full mortise, standard weight
1	Lockset (Storeroom Lock)	Cylindrical lock, Lock trim (accessible)
1	Closure w/hold open	
1	Silencer pack	

HW – 3
Door #'s: 103 – Corridor
(WD, Single UL Listed)

3	Hinges (1 ½ pair)	Antifriction bearing, full mortise, non-rising pin, heavy weight
1	Exit Device	Rim, Level Trim
1	Lockset (Storeroom Lock)	Cylindrical, Lock Trim (accessible)
1	Silencer pack	

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior non load-bearing steel stud partition framing 20 gage and lighter (designed for 5 pounds per square foot uniform load perpendicular to partition).
   2. Gypsum board.

B. Related Sections:
   1. Section 05400 - Cold Formed Metal Framing: Load-bearing steel stud exterior and interior wall framing 20 gage and heavier and ceiling joists. Cold formed deep leg track for interior nonload-bearing steel stud partitions. Metal stud header wall framing and bracing supported from roof structure.
   2. Section 06100 - Rough Carpentry: Wood furring strips, plywood, blocking, and fasteners attached to partition framing.
   3. Section 09900 - Painting: Paint finish applied to gypsum board.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.

B. ASTM International (ASTM):
   1. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. ASTM C475 - Joint Compound and Joint Tape for Finishing Gypsum Board.
   3. ASTM C 557 - Adhesives for Fastening Gypsum Wallboard to Wood Framing.
   4. ASTM C 645 - Nonstructural Steel Framing Members.
   5. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
   6. ASTM C 840 - Application And Finishing Of Gypsum Board.
   7. ASTM C 954 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs From 0.033 inches to 0.112 inches in Thickness.
   8. ASTM C 1002 - Steel Self-Piercing Tapping Screws For The Application Of Gypsum Panel Products Or Metal Plaster Bases To Wood Studs Or Steel Studs.
   9. ASTM C 1177 - Glass Mat Gypsum Substrate for Use as Sheathing.
   10. ASTM C 1178 - Coated Glass Mat Water-Resistant Gypsum Backing Panel.
   11. ASTM C 1288 - Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets.
   12. ASTM C 1396 - Gypsum Board.
   13. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
   14. ASTM D 3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.

C. Gypsum Association (GA):
   1. GA-214 - Levels of Gypsum Board Finish.
   2. GA-216 - Application and Finishing of Gypsum Board.
   3. GA-600 - Fire Resistance and Sound Control Design Manual.

D. Steel Stud Manufacturer's Assocation (SSMA)
   1. Member listing

1.3 SUBMITTALS

A. Product Data: Provide product data for framing members.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in the installation of light gage metal framing components and gypsum wallboard with minimum 5 years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Transport, handle, store, and protect products.

B. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

C. Store and protect metal framing with weatherproof covering, and ventilate to avoid condensation.

D. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

E. Stack gypsum board flat to prevent sagging.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:
   1. Establish and maintain environmental conditions for applying and finishing gypsum board in conformance with GA-216.

PART 2 - PRODUCTS

2.1 FRAMING MATERIALS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
   1. Dietrich Metal Framing.
   2. The Steel Network.
   3. Other manufacturers listed as a member of SSMA.

B. Recycled Content of Steel Products: Provide steel framing products with an average recycled content of steel products such that the postconsumer recycled content plus 1/2 of preconsumer recycled content is not less than 25 percent.

C. Interior Nonload-Bearing Partition Framing: ASTM C 645 and C 754; galvanized sheet steel, channel shaped, punched for utility access, depth and gages as indicated below unless otherwise indicated on Drawings.
   1. Partition having an unbraced length of 12 feet or Less: Minimum 25 gage (18 mil).
   2. Partition having an unbraced length greater than 12 Feet: Minimum 20 gage (30 mil).
   3. Partition (bulkheads) suspended from overhead having an unbraced length of 10 Feet or Less: Minimum 25 gage (18 mil).
   4. Partition height 8 feet and less: Minimum 25 gage (18 mil).
   5. Partition height 8 - 16 feet: Minimum 22 gage (27 mil)

6. Partition height 16 feet and higher: Minimum 20 gage (30 mil).

D. Option: Modified framing members of equivalent thickness for 20 and 25 gage metal such as UltraSTEEL by Dietrich may be used in lieu of traditional framing members.

E. Partition Floor Tracks and Runners: ASTM C 645; galvanized sheet steel, channel shaped, same depth and gage as studs, tight fit; solid web.

F. Furring and Bracing: ASTM C 645; galvanized sheet steel.
1. Studs: ST25 - 2-1/2 inch deep, 25 gage (18 mil).
2. Studs: ST25 - 3-5/8 inch deep, 25 gage (18 mil).
3. Hat-Shaped Channels: 7/8 inch deep x 1-1/2 inch wide, 25 gage (18 mil).
4. Cold-Rolled Channels: 3/4 x 1/2 inch and 1-1/2 x 17/32 inch, 16 gage (54 mil).
5. Z Furring Channel: 1-1/2 inch deep, 25 gage (18 mil).
6. Clip Angles: 2 inches x 2 inches x 16 gage (54 mil) x 1/4 inch less than stud width.
7. Contractor's Option: In leiu of cold rolled channels and clip angles for horizontal wall bridging, Contractor may provide one of the following:
   a. Bridge Bar by the Steel Network.
   b. TradeReady Spazzer 9200 Bridging and Bracing Bar by Dietrich Metal Framing

G. Ceiling Joists, Tracks, Headers at Partition Openings, Framing Attachment Angles, and Fasteners: Specified in Section 05400.

H. Partition Framing Fasteners: Corrosion-resistant self-drilling self-tapping steel screws.
1. 22 Gage (27 mil) Framing: ASTM C 1002; 3/8 inch Type S pan head.
2. 20 Gage (30 mil) and Heavier Framing: ASTM C 954; 5/8 inch Type S-12 low-profile head.

I. Bracing to Framing Attachment Angle Fasteners: #12 diameter pan head corrosion-resistant self-drilling screws.

J. Partition Floor Track Anchorage Device: Low velocity powder-actuated drive pins; minimum 0.138 inch shank diameter x 1-1/2 inch shank length with 7/8 inch diameter washer.
1. Hilti PAT System using X-ZF 37 P8S36 Pins, by Hilti, Tulsa, OK. (800) 879-8000.
2. Ramset/Red Head System using 1500SD Pins, by ITW Ramset/Redhead, Wood Dale, IL (630) 350-0370.

2.2 GYPSUM BOARD MATERIALS

A. Manufacturer: United States Gypsum Company, Chicago, IL. (800) 874-4968.
1. United States Gypsum (USG) gypsum wallboard designations are used within this Section to identify gypsum wallboard and accessory types, unless noted otherwise.
2. Alternate Manufacturers: Subject to compliance with project requirements, unless otherwise specified, gypsum board and accessories equivalent to the USG products specified, by one of the following alternate manufacturers may be provided:
   a. CertainTeed Corp., Tampa, FL. (866) 427-2872.
   b. Georgia-Pacific, Atlanta, GA. (800) 284-5347.
   c. National Gypsum Company, Gold Bond Building Products, Charlotte, NC. (800) 628-4662.
   d. The Steel Network, Raleigh, NC (888) 474-4876. (Accessories only)
   e. Dietrich Metal Framing, Pittsburg, PA (412) 281-2805. (Accessories only)

B. Standard Gypsum Board: Sheetrock, ASTM C 1396; 1/2 inch and 5/8 inch thick, maximum

permissible length; ends square cut, tapered edges.

C. Water Resistant Gypsum Board: ASTM C 1396 or C 1658, 1/2 inch thick, maximum permissible lengths; ends square cut, tapered edges. Mold resistance of water resistant gypsum board shall score a rating of not less than 10 when tested in accordance with ASTM D 3273. Provide the following:
   1. Fiberock Brand Aqua-Tough Gypsum Interior Panels by USG

D. Fire Resistant Gypsum Board: Sheetrock Firecode Core, ASTM C 1396, Type X; 5/8 inch thick, maximum permissible lengths; ends square cut, tapered edges; core material as required to comply with Underwriters Laboratories (UL) assemblies indicated on Drawings.

E. Water and Fire Resistant Gypsum Board: Sheetrock Mold Tough Firecode "C" Core or Gold Bond Brand XP Fire-Shield C Gypsum Board, ASTM C 1396, Type X; 5/8 inch thick, maximum permissible lengths; ends square cut, tapered edges, core material as required to comply with Underwriters Laboratories (UL) assemblies indicated on Drawings. Mold resistance of water and fire resistant gypsum board shall score a rating of not less than 10 when tested in accordance with ASTM D 3273.

F. Abuse Resistant Gypsum Board: Panels meeting Soft Body Impact Resistance tested in accordance with ASTM E 696, level 2. 5/8 inch thick. Maximum permissible lengths; ends cut, tapered edges.

G. Gypsum Board Fasteners:
   1. Metal Framing: ASTM C 954 and C 1002, Type S-12 bugle head, corrosion-resistant self-drilling self-tapping steel screws.
      a. One Layer 1/2 Inch: 1 inch.
      b. One Layer 5/8 Inch: 1-1/8 inch.
      c. Two Layers: 5/8 Inch: 1-7/8 inch.

H. Wood Furring: ASTM C 1002, 1-1/4 inch, Type W bugle head, corrosion-resistant self-drilling steel screws.

I. Gypsum Board Accessories:
   1. Corner Beads: No. 104 Dur-A-Bead galvanized steel corner bead.
   2. Edge Trim: Galvanized steel casing.
      a. No. 200-B, L shape for tight abutment at edges.
      b. No. 200-A, J shape at other locations.
   3. Control Joint Accessory Piece: No. 093 roll-formed zinc.
   4. Vertical Movement Joint Trim: No DRMZ-625-200 aluminum Z shape trim by Fry Reglet.
   5. Adhesive: Commercial adhesive complying with ASTM C 557.
   6. Acoustical Insulation: Unfaced fiberglass batts specified in Section 07210.
   7. Firestopping: Specified in Section 07840 for penetrations of fire-resistive rated gypsum board.

2.3 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper tape.
   2. Exterior Gypsum Soffit Board: Paper tape.
   3. Gypsum Sheathing Board: 10/10 grid glass mesh tape.
   4. Backer Panels: Glass-Mat Backer Material: 10/10 grid glass mesh tape.

C. Joint Compound
   1. Interior Gypsum Wallboard: Sheetrock Ready-Mixed Lightweight All-Purpose Joint Compound with Dust Control.
      a. Substitutions not permitted.
   2. Exterior Applications:
      a. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
      b. Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
   3. Backer Panels: Glass-Mat Backer Materials: Use setting-type taping compound as recommended by backer panel manufacturer and that is rated 10 when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing conditions and adjacent areas where products will be installed and verify that conditions conform to product manufacturer's requirements. Verify that building framing components are ready to receive Work. Verify that rough-in utilities are in-place and located where required. Do not proceed until unsatisfactory conditions have been corrected.

B. Examine panels to assure they are dry and free of moisture and mold damage as evidenced by discoloration, sagging, irregular shape, fuzzy or splotchy surface contamination, and discoloration.

C. Beginning of erection and installation indicates acceptance of existing conditions.

3.2 INSTALLATION - STEEL FRAMING, GENERAL

A. Installation Standards: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation and with further details and instruction by gypsum board manufacturer's written construction guidelines.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply, if none available, with United States Gypsum's "Gypsum Construction Handbook."

3.3 INSTALLATION - PARTITION FRAMING

A. Install studs and fasteners in accordance with manufacturer's published instructions, ASTM C 754, GA-216, and GA-600.

B. Metal Stud Spacing: Unless otherwise noted, provide interior framing at maximum 24 inches on center. Provide 16 inches on center maximum spacing for walls to receive ceramic tile.

C. Align stud web openings horizontally.

D. Splice studs with minimum 8 inch nested lap, fasten each stud flange with minimum two screws.

E. Construct corners using minimum three studs.

F. Double stud at wall openings, door and window jambs, maximum 2 inches from each side of openings.

G. Place studs as indicated on Drawings, minimum 2 inches from abutting walls.

H. Install headers at partition openings using load-bearing C-shaped joists specified in Section 05400.

I. Install framing between studs for attachment of mechanical and electrical items.

J. Install intermediate studs above and below openings to match wall stud spacing.

K. Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through ceiling to building structure above.

L. Maintain clearance under structural members to avoid deflection transfer to studs.
   1. Where indicated, construct partition to accommodate vertical deflection.
   2. Install optional products by The Steel Network specified in Part 2 above in accordance with manufacturer's printed instruction.
      a. Install clip with step bushing in center of slotted hole.
      b. Use a minimum of two fasteners per clip leg to connect clip to structure and partition framing.
      c. Attach clip to each stud by screwing through the center of each step bushing.

M. Blocking: Screw attach wood blocking between studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories and hardware.

N. Framing Fastening: Fasten framing in accordance with manufacturer's published instructions and schedule below, unless indicated otherwise on Drawings.

CONNECTION	FASTENER
Floor Track to Concrete	1 - Pin at 32 inches on center.
Partition Stud to Floor Track	1 - Screw each side at each flange.
Stud Brace Web to Stud Web	2 - Screws.
Plates and Straps to Studs	2 - Screws.
Stud Web to Stud Web	2 - Screws.
Stud Brace Web to Attachment Angle	2 - Screws.
Lateral Bracing to Partition Stud Using clip Angles	2 - Screws to stud and 2 - Screws to cold rolled channel.
Runner to Header	1 - Screw at 16 inches on center, maximum 6 inches from each end.

3.4 INSTALLATION - SUSPENDED CEILING

A. Unless otherwise shown, install suspended ceilings in accordance with the following requirements.

B. Suspend ceiling hangers from building structure as follows:
   1. Install 1 1/2" cold rolled channels 4'-0" oc with 8 ga hanger wire spaced a max of 4'-0" oc along carrying channels. Attach 7/8” screw furring channels spaced 16" oc perpendicular to the 1 1/2" channel with double strand of saddle tied # 16 ga galvanized tie wire or 1 1/2" furring channel clips. Apply 1/2" gypsum board with its long dimension at right angles to the furring channels. Attach gypsum board with 1" self drilling drywall screws 12" oc in the

field of the board 8" or 12" oc at butt joints, located not more than 1/2" from edges.

2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interferes with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
4. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet measured lengthwise on each member and transversely between parallel members.

3.5 INSTALLATION - FURRING

A. Furring Channels:
1. Attach vertically spaced at maximum 16 inches on center, to masonry and concrete surfaces with hammer set or powder driven fasteners staggered 24 inches on center on opposite flanges.
2. Nest channels 8 inches at splices and anchor with 2 fasteners in each wing.

B. Wall Furring:
1. Secure top and bottom runners to structure.
2. Space metal studs at maximum 16 inches on center.
3. Furring for Fire Rating: Install metal furring as required for fire resistance ratings indicated on Drawings, and to GA-600 requirements.

3.6 ACOUSTICAL ACCESSORIES INSTALLATION

A. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions as specified in Section 07210.

3.7 INSTALLATION - GYPSUM BOARD

A. Install gypsum board in accordance with manufacturer's published instructions, ASTM C 840, GA-216, and GA-600.
1. Use water resistant gypsum board at wet areas including walls and ceiling in toilet rooms, janitor closets, and food prep areas as applicable and where shown.
2. Use fire resistant gypsum board at locations of fire-resistive rated assemblies indicated on Drawings.
3. Use water and fire resistant gypsum board at locations of fire-resistive rated assemblies where water resistant gypsum board is specified.
4. Use standard gypsum board at locations not indicated to be fire resistant or water resistant type.

B. Where applicable, install ceiling panels before the installation of wall panels.

C. Erect single layer gypsum board in most economical direction, with attachment to firm bearing surfaces over framing members. Do not align panel joints with edges of openings.

D. Treat cut edges, holes, fastener heads, and joints, including those at angle intersections, in water resistant gypsum board and exterior gypsum soffit board with specified joint compound. Treat prior to installation.

E. Place gypsum panels over supporting framing members with panel ends aligning and parallel with framing members. Leave approximately 1/2 inch gap above floor to prevent water and moisture from wicking up gypsum board.

F. Install fasteners from center of field of panel toward ends and edges. Install fasteners 3/8 inch from ends and edges of panels, and as follows:
   1. Ceiling: 12 inches on center, perimeter and field.
   2. Walls:
      a. Standard: 16 inches on center, perimeter and field.

3.8 JOINT TREATMENT

A. Reinforce interior and exterior corners at ceiling and wall surfaces. Apply 3 inch wide initial coating of joint compound, pressing tape firmly into joint compound. Wipe off excess joint compound. Apply second coat of joint compound with tools of sufficient width to extend beyond joint center, approximately 4 inches. Draw joint compound down to a smooth even plane.

B. After drying or setting, sand or sponge joints, edges, and corners, eliminating high spots and excessive joint compound to produce smooth finish surface. Prepare surfaces to receive subsequent finishes to height of 6 inches above finish ceiling. Feather coats onto adjoining surfaces resulting in maximum camber of 1/32-inch in 12.

C. Sand after second and third applications of joint compound. Do not to raise nap of paper when sanding.

D. Install control joints full height of partition with 1/2 inch gap between board edges and between studs. Control joints shall be installed in accordance with the Gypsum Association GA-234 or the gypsum manufacturer’s recommended guidelines for control joints. Apply sealant at base of joint and control joint accessory piece at face. Install control joints at the following locations:
   1. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.
   2. At pairs of doors, install vertical control joint at each jamb. At single doors, install control joint at latch side of jamb.

E. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

3.9 FINISH

A. Apply gypsum board finish in accordance with manufacturer's published instructions and GA-214 Finish Levels.

B. Provide gypsum board finish levels as follows:
   1. Level 3 (GA-214): Joints and interior angles have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles and two separate coats of joint compound are applied over joints, angles, fastener heads, and

accessories. Surface smooth and free of tool marks and ridges.

2. Level 3: Joints and interior angles have tape embedded in joint compound and two separate coats of joint compound applied over joints, angles, fastener heads, and accessories. Surface smooth and free of tool marks and ridges.

3.10 CONSTRUCTION

A. Interface with Other Work:
   1. Coordinate erection of studs with hollow metal door and window frames, sliding window, and overhead coiling door frames.
   2. Coordinate installation of anchors, supports, and blocking for mechanical, electrical, and building accessory items installed within framing.

3.11 FIELD QUALITY CONTROL

A. Inspect metal framing erection, placement, spacing, fasteners, and connections to building.

B. Inspect gypsum board installation, fastener type, spacing, and finish level.

C. Inspect installation of firestopping penetrations of fire-restive rated partitions and at voids between top of partition and building structure.

D. Correct deficiencies in Work which inspection indicates are not in compliance with Contract Documents.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes ceilings composed of acoustical panels and exposed suspension 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 type of product specified to match existing in area of replacement

C. Coordination drawings for reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show the following:
   1. Ceiling suspension system members.
   2. Method of attaching suspension system hangers to building structure.
   3. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
   4. Minimum Drawing Scale: 1/8 inch = 1 foot.

D. Samples for initial selection in the form of manufacturer's color charts consisting of actual acoustical panels or sections of panels and sections of suspension system members showing the full range of colors, textures, and patterns available for each ceiling assembly indicated.

E. Samples for verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. 6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.
   2. Full-size samples of each acoustical panel type, pattern, and color.
   3. Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.

F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

G. Product test reports from a qualified independent testing agency that are based on its testing of current products for compliance of acoustical panel ceilings and components with requirements.

H. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that show compliance of acoustical panel ceilings and components with the building code in effect for the Project.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
   1. Fire-response tests are performed by a qualified testing and inspecting agency. Qualified testing and inspecting agencies include Underwriters Laboratories (UL), Warnock Hersey, or another agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
   2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
   3. Acoustical panel ceilings indicated are identical in materials and construction to those tested for fire resistance per ASTM E 119.
   4. Fire-resistance-rated, acoustical panel ceilings are indicated by design designations listed in the UL "Fire Resistance Directory," in the Warnock Hersey "Certification Listings," or in the listing of another qualified testing and inspecting agency.
   5. Products are identified with appropriate markings of applicable testing and inspecting agency.

C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling panel from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
   1. Obtain both acoustical panels and suspension system from the same manufacturer.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels and suspension system components 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 panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
   1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 2.0 percent of amount installed.
   2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, acoustical panels that may be incorporated in the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following for each panel type indicated or approved equivalent:
   1. ACT#1 Non-Fire-Resistance-Rated, Water-Felted, Mineral-Base Panels. Sizes as shown. Provide one of the following:
      a. Radar Auratone Omni Fissured: USG Interiors, Inc.
      b. Minaboard Cortega; Armstrong World Industries, Inc.
      c. Acoustic–Tough Ceiling System; Soft Look Tunico, Tectum, Inc.
   2. ACT#2 Fire-Resistance-Rated, Water-Felted, Mineral-Base Panels. Sizes as shown. Provide one of the following:
      a. Radar Auratone Fire Code Omni Fissured; USG Interiors, Inc.
      b. Fire Guard Cortega; Armstrong World Industries, Inc.
   3. ACT#3 Non-Fire-Resistance-Rated, square edge, non-perforated, vinyl faced gypsum which satisfy USDA/FSIS guidelines for sanitary applications. Sizes as shown. Provide one of the following:
      a. VinylRock by Certain Teed.
      b. Sheetrock Lay-in Celing Panel ClimaPlus by USG
      c. Grinstone Brand Gypsum Ceiling Panels by National Gypsum

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in each Acoustical Panel Ceiling Product Data Sheet at the end of this Section.

D. Products: Subject to compliance with requirements, provide one of the products specified in each Acoustical Panel Ceiling Product Data Sheet at the end of this Section.

2.2 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
   1. Mounting Method for Measuring Noise Reduction Coefficient (NRC): Type E-400 per ASTM E 795.
   2. Test Method for Ceiling Attenuation Class (CAC): Where acoustical panel ceilings are specified to have a CAC, provide units identical to those tested per ASTM E 1414 by a qualified testing agency.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
   1. Where appearance characteristics of acoustical panels are indicated by reference to ASTM E 1264 pattern designations and not to manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range of products that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Panel Characteristics: Comply with requirements indicated on each Acoustical Panel Ceiling Product Data Sheet at the end of this Section, including those referencing ASTM E 1264 classifications.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated.
   1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated Carbon Steel Wire: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.
   2. Nickel-Copper Alloy Wire: ASTM B 164, nickel-copper alloy UNS N04400.
   3. Size: Select wire diameter so that its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than the yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

E. Hanger Rods: Mild steel, zinc coated, or protected with rust-inhibitive paint.

F. Flat Hangers: Mild steel, zinc coated, or protected with rust-inhibitive paint.

G. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide, formed with 0.0396-inch- (1-mm-) thick galvanized-steel sheet complying with ASTM A 446, G 90 (ASTM A 446M, Z 275) Coating Designation, with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated, or if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
   1. For lay-in panels with reveal edge details, provide stepped-edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
   2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   3. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.

I. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For interior ceilings composed of acoustical panels weighing less than 1 lb per sq. ft. (4.88 kg per sq. m), provide hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.

J. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system design to absorb impact forces against acoustical panels.

2.4 NON-FIRE-RESISTANCE-RATED, DIRECT-HUNG SUSPENSION SYSTEMS

A. Wide-Face, Single-Web, Steel Suspension System: Main and cross runners roll formed from prepainted or electrolytic zinc-coated, cold-rolled steel sheet, with prepainted 15/16-inch- (24-mm-) wide flanges; other characteristics as follows:
   1. Structural Classification: Intermediate-duty system.
   2. Finish: Painted white.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
   1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
   2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
   3. CISCA Recommendations for Acoustical Ceilings: Comply with CISCA "Recommendations

for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."

4. CISCA Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies."
5. U.B.C. Standard for Ceiling Suspension Systems: U.B.C. Standard No. 47-18.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Splay hangers only where required, and if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. Secure bracing wires to ceiling suspension members and to supports with a minimum of 4 tight turns. Fasten bracing wires to concrete with cast-in-place or postinstalled anchors.
8. Do not support ceilings directly from permanent metal forms. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
9. Do not attach hangers to steel deck tabs.
10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
11. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not over 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.18 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:
   a. In the manner indicated on reflected ceiling plans.
   b. Install panels with pattern running in one direction parallel to long axis of space.
   c. Install panels with pattern running in one direction parallel to short axis of space.
   d. Install panels in a basket-weave pattern.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
5. Paint the cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended for this purpose by acoustical panel manufacturer.
6. Install hold-down clips in areas indicated and in areas required by governing regulations, or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Vinyl composition floor tile.
2. Resilient wall base and accessories.

1.3 QUALITY ASSURANCE

B. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.5 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post installation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install tiles and accessories after other finishing operations, including painting, have been completed.

E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.

F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to:

1. Armstrong World Industries
2. or approved equal

Contractor to verify that flooring selected is appropriate for application of Owner selected Cleaner, Sealer and Wax. See section 3.05 Cleaning and Protecting.

2.2 VINYL COMPOSITION TILE

A. Vinyl Composition Floor Tile: Armstrong 51911 – Classic White

B. Vinyl composition tile shall conform to the requirements of ASTM F 1066, Class 2 – through pattern.

2.3 RESILIENT ACCESSORIES

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I.
B. Color to match existing.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with 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 with Armstrong

[S-183 Fast-Setting Cement-Based Underlayment][S-184 Fast-Setting Cement-Based Patch and Skim Coat][S-194 Fast-Setting Cement-Based Patch and Underlayment] 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 or for Tile Installation System, Tile On , 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” and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. [Relative humidity shall not exceed 80%.][MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. 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” and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 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 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
   1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles in pattern to match existing installation.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, non-staining marking device.

G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
   1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Hand roll tiles according to tile manufacturer's written instructions.

3.4 RESILIENT ACCESSORY INSTALLATION

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to wall areas where base is required.
   1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
   2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
   3. Do not stretch base during installation.
   4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

5. Install pre-molded inside corners before installing straight pieces.

C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.5 CLEANING AND PROTECTING

A. Upon completion of resilient flooring and base installation clean the floors of all dirt and debris that could interfere with proper floor finish application. Remove excess adhesive from floor, base and wall surfaces without damaging finishes.

B. Do not wet wash, scrub or strip tile floor for at least five (5) days following installation.

C. Scrub the new floor tile to remove the factory applied sealer by scrubbing with a blue scrubbing pad and a water-rinse solution of Spartan Shineline Emulsifier Plus, diluted per the manufacturer's instructions. Contractor to verify with flooring manufacturer that Owner's selected scrubbing solution is acceptable for use on the selected resilient floor tile. Thoroughly remove dirty solution with a wet/dry vacuum after scrubbing action is complete.

D. Thoroughly rinse the floor with two (2) rinses of clear water.

E. Contractor shall seal any new tile installation with (2) coats of Spartan Dura Prime.

F. After the floor sealer has cured in accordance with the manufacturer's specifications, finish floor tile with (4) coats of Spartan Dura Gloss Laminate. Contractor shall use a high-speed burnisher to harden the floor finish and produce a "wet look" sheen.

END OF SECTION 09651

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 each type of carpeting is indicated on drawings, finish schedule and by specifications, and is defined to include carpet, cushion and accessories.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm (carpet mill) with not less than 5 years of production experience with carpet similar to types specified in this section; and whose published product literature clearly indicates general compliance of products with requirements of this section.

B. General Terminology/Information Standard: Refer to current edition of "Carpet Specifier's Handbook" by The Carpet and Rug Institute, for definitions of terminology not otherwise defined herein, and for general recommendations and information.

C. Flame/Smoke Resistance Standards: Where ratings are indicated for carpet or for carpet plus pad installations, provide materials complying with rating as indicated for the following test standards.
   1. Tunnel Test: Test for surface burning characteristics, with ratings for flame spread, fuel contribution, and or smoke density; ASTM E 84, UL 723, OR NFPA No. 255.
   2. Floor Radiant Panel Test: Test for burning under varying radiant energy levels; ASTM E 648, with minimum average radiant flux ratings not less than the following:
      a. FRPT Rating: 0.22 watts/sq. cm.
   3. Smoke Density Test: Test in radiant heat chamber, with and without flame, for density of smoke generated; ASTM E 662, or NFPA No. 258, also known as NBS Smoke Density Chamber Test.

D. Fade Resistance: Where fade resistance factor is indicated for carpet or carpet materials, provide materials which have been tested by AATCC Test Method 16 E, for a maximum grey scale factor of 4 when tested for a period of 40 hours except as otherwise indicated.

E. Static Resistance: Provide yarn or yarn blend as indicated in carpet construction, and include provisions to comply with static resistance ratings as indicated, either by selection of yarns known to be effective or by inclusion of small percentages of special anti-static yarn known to be effective in achieving indicated static resistance. Where rating is not otherwise indicated, provide 3.5 KV resistance for 20% R.H. at 70□F (21□C), AATCC 134.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's complete technical product data for each type of carpet, and accessory item required.

B. Samples: Submit 18" x 27" samples of each carpet required, 6" long samples of each type exposed edge stripping, and 6' square samples of separate cushions.

C. Indicate range of available selection from manufacturer’s standard carpet and colors.

D. Certification: Submit manufacturer's certification stating that carpet materials furnished comply with specified requirements.

E. Maintenance Data: Submit manufacturer's printed maintenance recommendations, including methods and frequency recommended for maintaining carpet in optimum conditions under anticipated traffic and use conditions.

1.5 EXTRA STOCK

A. Overrun: Where carpet is supplied from custom run at mill, produce and deliver to project at least 5% overrun on calculated yardage. Provide required overrun exclusive of carpet needed for proper installation, waste and usable scraps.

1.6 PRODUCT DELIVERY AND STORAGE

A. Deliver carpeting materials in original mill protective wrapping with mill register numbers and tags attached. Store inside, in well ventilated area, protected form weather, moisture and soiling.

1.7 WARRANTY

A. Provide special project warranty, signed by Contractor, Installer and Manufacturer (Carpet Mill), agreeing to repair or replace defective materials and workmanship of carpeting work during 2 year warranty period following substantial completion. Attach copies of product warranties.

PART 2 - PRODUCTS

2.1 CARPET

A. Carpet Tile:
1. Style: 24” x 24” modules
2. Construction: Broadloom
3. Fiber: Nylon
4. Gauge: 1/10
5. Face Yarn Weight 26 oz./sy. Min.
6. Color: As selected from Manufacturers standard colors

2.2 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering carpet which may be incorporated in the work.
1. Shaw Industries.
2. Lee Carpets Div. Burlington Industries.
3. Milliken and Co.
4. Mohawk Carpet.
5. Stratton Industries.

2.3 CARPET ACCESSORIES

A. Carpet Edge Guard, Metallic: Extruded aluminum bend-down type edge guard with concealed gripper teeth and minimum 1” wide punched anchorage flange and minimum 5/8" wide face flange. Provide in hammered textured with anodized aluminum finish of colors selected by Architect from

among standard colors available within the industry (any manufacturer).

B. Carpet Edge Guard, Nonmetallic: Extruded or molded heavy-duty vinyl or rubber carpet edge guard size and profile indicated and with among standard colors available within the industry (any Manufacturer).

C. Installation Adhesive: Water resistant, non-staining type; as recommended by carpet or cushion manufacturer, and which complies with flammability requirements for installed carpet.

D. Seaming Cement: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer, for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.

E. Miscellaneous Materials: As recommended by manufacturers of carpet, cushions and other carpeting products; and selected by Installer to meet project circumstance and requirements.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION REQUIREMENTS

A. Examine substrates for moisture content and other conditions under which carpeting is to be installed. Repair minor holes, cracks, depressions or rough areas using material recommended by carpet or adhesive manufacturer. Do not proceed until unsatisfactory conditions have been corrected.

B. Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting, vacuum clean immediately before installation. Check concrete surfaces to ensure no "dusting" through installed carpet, apply sealer where required to prevent dusting.

C. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.2 INSTALLATION

A. General:
1. Comply with manufacturer's instructions and recommendations for seam locations and direction of carpet, maintain uniformity of carpet direction and lay of pile. At doors, center seams under doors, do not place seams in traffic direction at doorways.
2. Extend carpet under open bottomed obstructions and under removable flanges and furnishing, and into alcoves and closets of each space.
3. Provide cut-outs where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges.
4. Install carpet edge guard where edge of carpet is exposed, anchor guards to substrate.
5. Expansion Joints: Do not bridge building expansion joints with continuous carpeting, provide for movement.

B. Glue down Installation:
1. Fit sections of carpet into each space prior to application of adhesive. Trim edges and butter cuts with seaming cement.
2. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form seams without gaps. Roll entire carpet area lightly to eliminate air pockets and ensure uniform bond. Remove adhesive promptly from face of carpet.

3.3 CLEANING AND PROTECTION

A. Remove and dispose of debris and unusable scraps.

B. Vacuum carpet using commercial machine with face beater element. Remove spots and replace carpet where spots cannot be removed. Remove any protruding face yarn using sharp scissors.

C. Provide protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field painting of the following:
   1. Exposed interior items and surfaces.
   2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
   1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork and casework.
      b. Acoustical wall panels.
      c. Finished mechanical and electrical equipment.
      d Light fixtures.
      e. Distribution cabinets.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      a. Ceiling plenums.
   3. Finished metal surfaces include the following:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper.
      e. Bronze and brass.
   4. Operating parts include moving parts of operating equipment and the following:
      a. Valve and damper operators.
      b. Linkages.
      c. Sensing devices.
      d. Motor and fan shafts.
   5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:
   1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
   2. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.

3. Division 9 Section "Gypsum Board Assemblies" for surface preparation for gypsum board.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.
1. Material List: Provide 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: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.

D. 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.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system

from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
   1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
      a. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.
      b. Small Areas and Items: The Architect will designate an item or area as required.
   2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
      a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
   3. Final approval of colors will be from job-applied samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.
   8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
   1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

C. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
   1. Devoe & Raynolds Co. (Devoe).
   2. Fuller-O'Brien Paints (Fuller).
   3. Glidden Co. (The) (Glidden).
   4. Benjamin Moore & Co. (Moore).
   5. PPG Industries, Inc. (PPG).
   6. Pratt & Lambert, Inc. (P & L).
   7. Sherwin-Williams Co. (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match colors indicated by reference to manufacturer's color designations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will

be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
   c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

c. When transparent finish is required, backprime with spar varnish.
d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed

surfaces.

8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Omit primer on metal surfaces that have been shop primed and touchup painted.
   3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:
   1. Piping, pipe hangers, and supports.
   2. Heat exchangers.
   3. Tanks.
   4. Ductwork.
   5. Insulation.
   6. Motors and mechanical equipment.
   7. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:
   1. Conduit and fittings.
   2. Switchgear.

3. Panelboards.

H. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

J. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
4. Provide satin finish for final coats.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
   a. Quantitative material analysis.
   b. Abrasion resistance.
   c. Apparent reflectivity.
   d. Flexibility.
   e. Washability.
   f. Absorption.
   g. Accelerated weathering.
   h. Dry opacity.
   i. Accelerated yellowness.
   j. Recoating.
   k. Skinning.
   l. Color retention.
   m. Alkali and mildew resistance.

3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
   1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 PAINT SHEEN SCHEDULE

A. Gloss:
   1. Exterior metal surfaces.
   2. Exterior hollow metal doors and frames (inside and outside surfaces).
   3. Roof hatch (inside and outside surfaces).
   4. Interior & exterior pipe bollards.
   5. Interior & exterior metal railings.
   6. Metal stair stringers and handrails.
   7. Metal fixed ladders and cages.

B. Semi-gloss:
   1. Interior hollow metal doors and frames.
   2. Interior hollow metal window frames.
   3. Wood trim or simulated wood trim scheduled to be painted.
   4. Coiling metal counter doors.
   5. Toilet gypsum board ceilings.
   6. Interior columns surfaces to receive epoxy finish.

C. Eggshell:
   1. All surfaces to be painted where a sheen is not otherwise specified.

D. Flat:
   1. Exterior Insulation and Finish System.
   2. Exterior gypsum board ceilings.
   3. Exterior concrete.

3.8 PAINT SCHEDULE

A. Apply paint to the substrate surface scheduled as applicable as specified or as shown on the drawings in accordance with the following:

Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
EXTERIOR PAINTING SCHEDULE							
Ferrous Metal	Gloss	Pro Industrial ProCryl Universal Primer B66-310	3.0	100	2 Coats: Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0
Ferrous Metal Over factory painted surface	Gloss	Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0	1 Coat: Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0
Ferrous Metal (Existing roof mounted equip framing to remain)	Gloss	All States except CA: Epolon II Rust Inhibitive Epoxy Primer B67W400, B67A400, B67A400 State of CA: Macropoxy 646-100, B58W620, B58V620	4.0 5.0-10.0	300 <100	2 Coats: WB Acrolon 100 Water Based Urethane B65-720, B65V720	2-4	<100
Ferrous Metal (Satellite dish support and exposed rooftop refrigeration and HVAC support framing.	Gloss	Pro Industrial ProCryl Universal Primer B66-310	4.0	100	2 Coats: WB Acrolon 100 Water Based Urethane B65-720, B65V720	2-4	<100
Prefinished Ferrous Metal (Underside of metal roof panels where exposed)	Gloss	PrepRite Bonding Primer B51W50	4	42	1 Coat: Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0
Prefinished Metal Trim (If shown to be repainted)	Low Sheen	Bond-Plex Waterbased Acrylic B71-200 Series	4.0	48	1 Coat: Bond-Plex Waterbased Acrylic B71-200 Series	4.0	48

Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
Galvanized Trim	Semi-gloss	Pro Industrial ProCryl Universal Primer B66-310	3.0	100	2 Coats: Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0
Nonferrous and Galvanized Metal	Semi-gloss	Pro Industrial ProCryl Universal Primer B66-310	3.0	100	2 Coats: Pro Industrial Zero VOC Enamel, B66-600 Series	4.0	0
Concrete Masonry Unit Elastomeric (50 degrees F or above)	Flat	Heavy Duty Block Filler B42W46	18.0	100	2 Coats: Conflex XL High Build Elastomeric, A5-400	6-7.5	97
Concrete Masonry Unit Elastomeric (Below 50 degrees F)	Flat	Loxon Block Surfacer, A24W200 (Above 35°F)	8.0	81	2 Coats: UltraCrete Solvent Borne Masonry Coating, B46 Series (Above 20° F)	6-8	400
Exterior Insulation and Finish System	Flat	A-100 Exterior Latex Finish, A6-100 Series	1.3	49	1 Coat: A-100 Exterior Latex Finish, A6-100 Series	1.3	49
Fiber Cement Siding	Flat	Loxon Concrete and Masonry Primer, B28W8300	3.2	96	2 Coats: A-100 Exterior Latex Finish, A6-100 Series	1.3	49
Precast Concrete	Flat	Loxon Concrete and Masonry Primer, B28W8300	3.2	96	2 Coats: A-100 Exterior Latex Finish, A6-100 Series	1.3	49
Exposed Timber, Purlins, Plywood, Wood	Semi-Transparant Stain	WoodScapes Polyurethane Stain A15T5	1.3	79	1 Coat: WoodScapes Polyurethane Stain A15T5	1.3	79
Exposed Timber, Purlins, Plywood, Wood	Opaque Stain	1 Coat: WoodScapes Latex Stain A15W51	1.3-2.6	<100	1 Coat: WoodScapes Latex Stain A15W51	1.3-2.6	<100
Gypsum Board (Ceiling)	Flat	A-100 Exterior Latex Primer, B42W43	1.4	87	2 Coats: A-100 Exterior Latex Finish, A6-100 Series	1.3	49
Concrete Pavement	Egg-shell	Setfast Acrylic Waterborne Traffic Marking Paint, TM	8.5	100	1 Coat: Setfast Acrylic Waterborne Traffic Marking Paint, TM 226/227	8.5	100

Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
		226/227					
INTERIOR PAINTING SCHEDULE							
Ferrous Metal (Except as otherwise scheduled)	Gloss	Pro Industrial ProCryl Universal Primer B66-310	2	100	All States except CA: 2 Coats: Pro Mar 200 Interior Latex Gloss Enamel, B21W200 State of CA: 2 Coats: Solo Gloss Low VOC Enamel, B21WJ Series	1.5 1.6	143 49
Ferrous Metal (Except as otherwise scheduled)	Semi-gloss	ProCryl Universal Primer B66-310	2	100	2 coats ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 Series	1.6	0
Ferrous Metal (Except as otherwise scheduled)	Eggshell	Pro Industrial ProCryl Universal Primer B66-310	2	100	2 Coats: ProMar 200 Zero VOC Interior Latex Eggshell Enamel, B20-2600 Series. Exception: Interior columns shall receive only 1 coat.	1.7	0
Ferrous Metal (Dryfall system over shop primed steel - overhead structure)	Flat	Waterborne Acrylic Dryfall, B42 Series Touch up prime welds, bare spots, blemishes, and scratches with Pro Industrial ProCryl Universal Primer B66-310	4.5	58			
Ferrous Metal (Dryfall system over unprimed steel - overhead structure)	Flat	Pro Industrial ProCryl Universal Primer B66-310	2	100	1 coat: Waterborne Acrylic Dryfall, B42 Series	4.5	58
Ferrous Metal (Columns and Hollow Metal Door Frames as	Semi-gloss	All states except CA: Epolon II Rust Inhibitive Epoxy Primer B67W400, B67A400, B67A400 State of CA: Macropoxy 646-100, B58W620,	4.0 5.0-10.0	300 <100	1 Coat: WB Acrolon 100 Water Based Urethane B65-720, B65V720.	2-4	<100

Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
shown on Drawings to receive epoxy)		B58V620					
Galvanized Metal (Exposed Ductwork)	Flat	Pro Industrial ProCryl Universal Primer B66-310	2	100	1 coat: Waterborne Acrylic Dryfall, B42 Series	4.5	100
Galvanized Metal (freezer/cooler panels)	Eggshell	Pro Industrial ProCryl Universal Primer B66-310	2	100	2 Coats: ProMar 200 Zero VOC Interior Latex Eggshell Enamel, B20-2600 Series	1.7	0
Concrete Walls	Gloss	Loxon Concrete and Masonry Primer, B28W8300	3.2	96	All States except CA: 2 Coats: ProMar 200 Interior Latex Gloss Enamel, B21W200 State of CA: 2 Coats: Solo Gloss Low VOC Enamel, B21WJ Series	1.5 1.6	143 49
Concrete Walls	Egg-shell	Loxon Concrete and Masonry Primer, B28W8300	3.2	96	2 Coats: ProMar 200 Zero VOC Interior Latex Eggshell Enamel, B202-2600 Series	1.7	0
Concrete Masonry Unit	Gloss	PrepRite Block Filler, B25W25	8.0	45	All States except CA: 2 Coats: ProMar 200 Interior Latex Gloss Enamel, B21W200 State of CA: 2 Coats: Solo Gloss Low VOC Enamel, B21WJ Series	1.5 1.6	143 49
Concrete Masonry Unit	Eggshell	PrepRite Block Filler, B25W25	8.0	45	2 Coats: ProMar 200 Zero VOC Interior Latex Eggshell Enamel, B20-2600 Series	1.7	0
Gypsum Board	Gloss	ProMar 200 Zero VOC Latex Primer, B28W02600	1.5	0	All States except CA 2 Coats: ProMar 200 Interior Latex Gloss Enamel, B21W200 State of CA: 2 Coats: Solo Gloss Low VOC Enamel, B21WJ Series	1.5 1.6	143 49
Gypsum Board	Semi-gloss	ProMar 200 Zero VOC Latex Primer, B28W02600	1.5	0	2 Coats: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 Series	1.6	0
Gypsum Board	Egg-shell	ProMar 200 Zero VOC Latex Primer, B28W02600	1.5	0	2 Coats: ProMar 200 Zero VOC Interior Latex Eggshell Enamel, B20-2600 Series	1.7	0
Wood	Semi-	ProMar 200 Zero VOC	1.5	0	2 Coats: ProMar 200 Zero	1.6	0

Surface	Sheen	1st Coat	DFT (mils) (per coat)	VOC (g/l)	2nd and 3rd Coats	DFT (mils) (per coat)	VOC (g/l)
	gloss	Latex Primer, B28W02600			VOC Interior Latex Semi-Gloss Enamel, B31-2600 Series		
Wood (Transparent sealer (Finish S1)	Stain	Wood Classics Varnish Sanding Sealer, B26V43; or approved equivalent	1.2	522	2 Coats: Wood Classics Polyurethane Varnish, A67 Series; or approved equivalent	1.7	492
Wood (Exposed laminated wood roof structure)	Semi-gloss	PrepRite ProBlock Interior/Exterior Latex Primer Sealer B51 Series	1.4	97	2 Coats: ProMar 200 Zero VOC Interior Latex Semi-Gloss Enamel, B31-2600 Series	1.6	0
Concrete Floors	Semi-gloss	Macropoxy 646-100, B58W620, B58V620	5.0-10.0	<100	Macropoxy 646-100, B58W620, B58V620	5.0-10.0	<100

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of signs:
   1. Interior panel signs.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 1 Section "Temporary Facilities" for temporary project identification signs.
   2. "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
   3. "Interior Lighting" for illuminated exit signs.
   4. Electrical service and connections for illuminated letters.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data:
   1. Manufacturer's signed statement regarding compliance with QUALITY ASSURANCE Article.

   2. Manufacturer's product literature indicating units and designs selected.

   3. Evidence of manufacturer's computerized data retrieval program for tracking of Project for sign typography, message strip requirements and other pertinent data from schedule input to final computerized typography on finished product.

   4. Maintenance data and cleaning requirements for exterior surfaces.

   5. Attachment techniques for specific substrates.

C. Shop drawings:
   1. Indicate materials, sizes, configurations, and applicable substrate mountings (for interior and exterior signs as necessary for application).

   2. Artwork for special ** graphics. ** headers. **

   3. Signage schedule complete with location of each sign and required copy; include floor plans.

D. Samples: Samples will ***not*** be returned for use in Project.

   1. Typography sample for message strips and headers copy.

   2. Interior Signs: Full size samples for holder, insert, and copy in colors specified. Provide sample in small size sign.

   3. Exterior signs: Provide full size samples of colors and materials of specific project

requirements.

E. Closeout Submittals:
1. Furnish appropriate checklist for aiding in reordering after Date of Substantial Completion. Maintain computer schedule program for ** five ** years for ordering new signage required by Owner.

2. Furnish one complete SignWord software package Windows 7 or later, in Owner selected format for PC type computer.

3. Furnish SignWord Color paper system

1.4 QUALITY ASSURANCE

A. Manufacturer:
1. Work required under this section from manufacturers regularly engaged in work of this magnitude and scope for minimum of five years.
2. Maintain computer link between schedule input and computerized typography production.

B. Single-Source Responsibility:
1. For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated.

1.5 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Manufacturers of interior signs;
   a. APCO Graphics, Inc. “Elements” Industrial System; 388 Grant Street SE, Atlanta, Georgia, 30312, USA. Phone; (404) 688-9000. Fax; (404) 577-3847.
   b. Other manufacturer's products are acceptable if submitted in accord with Product Options and Substitutions section and are in strict compliance with these specified requirements.

2.2 INTERIOR SIGNAGE

A. Assembly allows for flexibility of size and configuration, providing a modular, vandal-resistant solution for signs ranging from single-insert identification signs to large directories and directional signs.

1. Surface Mounted Signs (Wall or Office Panel):
   a. Attachment to wall surfaces via double-sided vinyl tape or concealed mechanical fasteners.

b. Attachment to office panels via concealed stainless steel pins or special aluminum or plastic clips.

B. Finishes: Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install signage holders in locations with mounting types indicated in accord with reviewed shop drawings. Square, plumb, and level units.

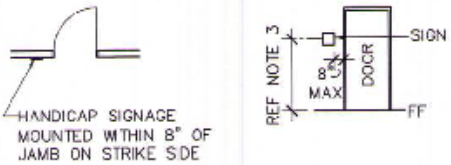
B. Install inserts not more than 48 hours prior to Date of Substantial Completion complete with correct copy in place. Conform to ADA requirements for tactile graphics signage.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

The next pages contain general signage standards. Coordinate with Integrated Sign Systems and Owner for final layout of each panel sign to be prepared.

SIGNAGE LEGEND



1. REQUIRED ACCESSIBLE ELEMENTS SHALL BE IDENTIFIED BY THE INTERNATIONAL SYMBOL OF ACCESSIBILITY AT THE FOLLOWING LOCATIONS

   –ACCESSIBLE ENTRANCES WHERE NOT ALL ENTRANCES ARE ACCESSIBLE

   –ACCESSIBLE ROOMS WHERE MULTIPLE SINGLE–USER TOILETS ARE CLUSTERED AT A SINGLE LOCATION

   –UNISEX TOILET AND RESTROOMS

   –ACCESSIBLE DRESSING ROOMS WHERE NOT ALL SUCH ROOMS ARE ACCESSIBLE

2. DIRECTIONAL SIGNAGE INDICATING THE ROUTE TO THE NEAREST LIKE ACCESSIBLE ELEMENT SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS. THESE DIRECTIONAL SIGNS SHALL INCLUDE THE INTERNATIONAL SYMBOL OF ACCESSIBILITY

   –AT EACH SEPARATE–SEX TOILET INDICATING THE LOCATION OF THE NEAREST UNISEX TOILET

3. TACTILE SIGNAGE SHALL BE LOCATED ON THE WALL TO THE DOOR'S LATCH SIDE AT A HEIGHT OF 60" AFF MAX TO THE BASELINE OF THE HIGHEST TACTILE CHARACTER. SIGNS MAY BE PLACED ON THE NEAREST ADJACENT WALL WHEN THERE IS NO WALL SPACE ON THE LATCH SIDE

4. CHARACTER AND SYMBOLS OF SIGNS SHALL BE IN CONTRAST WITH THEIR BACKGROUND AND SHALL BE EGGSHELL, MATTE, OR OTHER NON–GLARE MATERIALS OR FINISHES

5. ACCESSIBLE SIGNAGE SHALL USE GRADE II BRAILLE AND MUST COMPLY WITH ANSI A117.1 SECTION 703.4

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions apply to this Section.

1.2 SUMMARY

A. This section includes, but is not limited to:

1. Fire extinguishers.
2. Fire extinguisher cabinets.
3. Accessories.

1.3 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Wood blocking product and execution requirements.

1.4 REFERENCES

A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2007.

B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.5 SUBMITTALS

A. Shop Drawings: Indicate cabinet physical dimensions.

B. Product Data: Provide extinguisher operational features.

C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.7 WARRANTY

A. Provide one year warranty per IBC 2006 requirements

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

2.2 FIRE EXTINGUISHER CABINETS

A. Metal: Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.

B. Cabinet Configuration: Semi-recessed type.

1. Sized to accommodate accessories.
2. Exterior and interior nominal dimensions as required to accommodate fire extinguisher.
3. Trim: Returned to wall surface, with 2-1/2 inch (64 mm) projection, 1-3/4 inch (44 mm) wide face.
4. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

C. Door: 0.036 inch (0.9 mm) thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.

D. Door Glazing: Glass, clear, 1/8 inch (3 mm) thick float. Set in resilient channel gasket glazing.

E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

F. Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: Red enamel.

H. Finish of Cabinet Interior: White enamel.

2.3 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, mounting height from finished floor to inside bottom of cabinet. Install at locations as indicated on drawings. However, final locations are subject to requirement by governing authority.

C. Secure rigidly in place.

D. Place extinguishers and accessories in cabinets.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions (Exhibits A and B), apply to this Section.

1.2 SECTION INCLUDES

A. This division and the accompanying drawings cover furnishing of all labor, equipment, appliances and materials and performing all operations in connection with the installation of complete HVAC, Plumbing and Fire Protection systems as specified herein and as shown on the drawings.

B. The general provisions of the contract including Division 1 and other divisions are appropriate, apply to work specified in this division.

1.3 CODES AND REGULATIONS

A. All mechanical equipment and workmanship shall comply with the following codes and standards as applicable.
   1. International Building Code (2000 Edition) with Georgia & City of Atlanta Amendment.
   2. International Mechanical Code (2000 Edition) with Georgia Amendment.
   3. National Fire Protection Association: (NFPA).
   4. Georgia Handicapped Accessibility Law 120-3-20.
   5. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
   6. International Plumbing Code (2000 Edition) with Georgia amendments.
   7. American National Standards Institute (ANSI).
   8. American Society of Mechanical Engineers (ASME).
   9. State Energy Code for Buildings (2000 Edition) with Georgia Amendment.
   10. Federal Aviation Administration Advisory Circulars.

B. Applicable Publications:

The publication listed below form a part of this specification to the extent referenced and are referred to in the text by the basic designation only.
   1. Air Conditioning and Refrigeration Institute Standards (ARI).
   2. American Air Balance Council (AABC).
   3. American National Standards Institute, Inc. Standards (ANSI).
   4. American Society for Testing and Materials Publications (ASTM).
   5. American Society of Mechanical Engineers Code (ASME).
   6. American Gas Association (AGA).
   7. National Fire Protection Association Standard (NFPA).
   8. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA).

9. Underwriters Laboratories, Inc. (UL)
10. Factory Mutual Underwriters (FM). Factory Mutual Approval Guide.

C. All work done under this Contract shall comply with all state and local codes having jurisdiction and with the requirements of the Utility Companies whose services may be used. All modifications required by these codes shall be made by the Contractor without additional charges. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed. Where applicable, NFPA requirements shall be met.

D. In case of any conflicts between contract documents, the stricter/more stringent shall govern.

E. The Contractor shall obtain all permits, inspections, and approvals as required by all authorities having jurisdiction and deliver certificates of approval to the Engineer. All fees and costs of any nature whatsoever incidental to these permits, inspections and approvals must be assumed and paid by the Contractor.

F. The Contractor shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).

G. Workmanship and Materials

The workmanship and materials covered by these specifications shall conform to all ordinances and regulations of the city, county and/or other authorities having jurisdiction.

H. Contractor shall visit the site and examine existing conditions before submitting bid. No allowance will be made for lack of knowledge of existing conditions when such conditions can be determined by observation.

1.4 SUBMITTALS

A. The Contractor shall submit for review by the Architect data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive material, catalogs, cuts, diagrams, performance curves and charts published by the manufacturer to show conformance to specification and drawing requirements; model numbers alone will not be acceptable.

B. Refer to the individual sections for identified equipment and materials for which submittals are required.

C. Refer to Division 1 for required procedures.

D. Substitutions: Refer to Division 1 for required procedures.

E. Mechanical Equipment Electric Data:

F. Prior to submitting data for equipment requiring electrical service, the Contractor shall verify that electrical characteristics of equipment submittals comply with electrical service provided for the specified items of equipment.

G. Upon receipt of the Contractor of reviewed submittals for equipment provided under this Division, the Contractor shall coordinate the electrical service requirements, i.e., motor horsepower and full load amps, electrical service characteristics (voltage and phase), and number of services for each item of equipment requiring electrical connections with the electrical drawings and specifications.

H. Items on or projecting through the ceiling and the roof shall be coordinated with other trades.

1.5 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Refer to Division 1 for Detail Requirements.

B. The Contractor shall provide five Operation and Maintenance Manuals. The manuals shall be compiled in hard back, three ring note books. O&M manuals shall have permanent labels on front and side. The following information shall appear in each manual:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, complete nomenclature and commercial numbers of replacement parts for each piece of equipment.
2. Manufacturer's printed operating procedures to include start-up, break-in, 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.
5. Complete "as built" control diagrams showing cooling, heating and fire emergency systems. Clearly label equipment and/or device number, manufacturer, model number and function.
6. Complete "as built" sequence of operation describing cooling, heating and fire emergency modes. Clearly reference equipment valves, relays, interlocks sensors and control devices illustrated in control diagrams.
7. Piping diagrams for mechanical rooms.

C. The HVAC O&M manual shall be customized for each specific project and act as an easy-to-follow stand-alone operation guide for the building operator.

D. The Contractor shall turn O&M manuals over to the Engineer and shall be reviewed and approved prior to final pay application. The Program Manager shall turn over all five (5) O&M manuals over to the Owner.

1.6 INSTRUCTIONS OF OWNER PERSONNEL

A. Before final inspection, at a time designated by the Designer, provide a competent representative to instruct Owner's designated personnel in operation, adjustment and maintenance of products, equipment and systems under this Division of the

specifications. For equipment requiring seasonal operations, perform instructions for other seasons within six months unless requested otherwise.

B. Prepare and insert additional data in Operations and Maintenance Manual when needed, for such data becomes apparent during instructions.

C. The Contractor shall prepare and submit a comprehensive plan for the training of the Owner's personnel on all equipment provided under this section of the specification. This plan shall include a list of the equipment, the dates that training shall be provided and the manufacturers who will be providing each portion of the training. This plan shall be submitted to the Owner and approved, at least 30 days prior to the time that the training is scheduled to begin. All training sessions will be conducted by using the actual Operations and Maintenance Manuals which are provided by the Contractor on this project.

D. The following items shall be discussed for each piece of equipment:
   1. Sequence of normal operation for cooling and/or heating modes
   2. Routine maintenance schedule
   3. Location and operation of resets
   4. Location and operation of overrides
   5. Location and operation of overrides
   6. Location of service valves
   7. Areas served by equipment

1.7 RECORD DOCUMENTS

A. Refer to Division 1 for record documents and related submittals.

1.8 CERTIFICATES

A. The Contractor shall assemble and submit a single comprehensive listing of all installation certifications which are required to be provided to the Owner at the completion of the project.

1.9 RECORD DRAWINGS

A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings", reflecting an accurate dimensional record of all buried or concealed work. In addition, the "Record Drawings" shall be marked to show the precise location of concealed work and equipment, including concealed or embedded piping and valves and all changes and deviations in the Mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect.

B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.

C. The Contractor shall mark all "Record Drawings" on the front lower right hand corner with a rubber stamp impression that states the following:
"RECORD DRAWINGS (3/8" high letters)
To be used for recording Field Deviations and Dimensional Data Only". (5/16" high letters)

D. Payment requisition will not be approved if the drawings are not kept current.

E. Prior to leaving the job site once the work is complete, the Contractor shall furnish to the Engineer a complete marked-up mylar sepia set of final record drawings.

PART 2 - PRODUCTS

2.1 COORDINATION

A. The products of particular manufacturers have been used as the basis of design in preparation of these documents. Any modifications to the mechanical systems and their components, the electrical systems, the building structure and architecture, or any other portion of the building that result from the use of any other than that basis of design equipment shall be coordinated with all other trades. Such coordination shall occur before delivery of products from the manufacturer (before shop drawings submittals) and shall be clearly indicated on the shop drawings. Any related modifications shall be performed without any additional cost to the Contract.

2.2 DESCRIPTION

A. All products shall be new and bear the Underwriter's Laboratories, Inc. (UL) label where applicable unless specifically indicated otherwise.

B. No product or material containing asbestos shall be used.

PART 3 - EXECUTION

3.1 GENERAL

A. The plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, to coordinate with other trades in the same space and to thereby provide an integrated, coordinated and satisfactory operating installation. Do not scale drawings.

B. If the Contractor proposes to install equipment, including piping and ductwork, requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and connect

arrangement at no additional cost to the Owner, and shall have the Engineer review the change before proceeding with the work. The request for such changes shall be accomplished by shop drawings of the space in question.

C. The Contractor is responsible for the proper location and size of all slot, holes or openings in the building structure pertaining to his work, and for the correct location of sleeves, inserts, cores, etc.

D. The Contractor shall so coordinate the work of all trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. For example sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.

E. All piping and ductwork in finished areas, except where noted to the contrary, shall be installed in chases, furred spaces, above ceilings, etc. In all cases, pipes and ducts shall be installed as high as possible. Runs of piping shall be grouped whenever it is feasible to do so.

F. Piping shall be installed to pass inspections by local plumbing inspection department, state and federal authorities and insurance company having jurisdiction. Any changes or additions, which may be necessary to obtain such inspections and approval, shall be made by the Contractor as part of this Contract and without additional cost to the Owner.

G. Piping, ductwork or equipment shall not be installed in electrical equipment rooms or elevator machine rooms except as serving <u>only</u> those rooms. Outside of electrical equipment rooms, do not run piping or ductwork or locate equipment, with respect to switchboards, panelboards, power panels, motor control centers, dry type transformers.
   1. Within 42" in front (and rear if free standing) of equipment; or
   2. Within 36" of sides of equipment. Clearances apply vertically from floor to structure.
   3. Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system. Including, but not limited to, motors, valves, filters, dampers, shock absorbers, etc. Equipment located above lay-in type ceilings is considered accessible.

3.2 ELECTRICAL WORK

A. All electrical equipment provided under this Division shall comply with the electrical system characteristics indicated on the Electrical Drawings and specified in Division 16.

B. Equipment unit motor speed controls, starters, system controls, pilot lights, push-buttons, etc., shall be furnished complete as a part of the motor apparatus which it operates. All components shall be in conformance with the requirements of the

National Electrical Code and Division 16. All motor starters shall be provided with an H-O-A switch and control transformer. All starters and disconnect switches for mechanical equipment shall be furnished under Division 15 and installed by the electrical contractor. Coordinate installation with Electrical Contractor prior to his wiring of equipment.

C. All power wiring and final power connections to the system shall be provided under Division 16.

D. Control wiring (120V and less) shall be provided under Division 15 and extended from the starters, control transformers or 120V power circuits indicated on the Electrical Drawings. Interlock circuits for motorized damper and HVAC and fire alar interlocks shall be provided by the mechanical contractor. All wiring for voltages higher than 25 volts shall be done by a licensed electrician.

E. All electrical characteristics shall be taken from the Electrical drawings and Specifications and coordinated before equipment is ordered or submitted.

3.3 MOTORS

A. Unless specifically noted otherwise in other sections of this Specification, all motors and motor controls shall meet the requirements specified in this Section. All motors shall be built in accordance with the current applicable IEEE, and NEMA standards and shall have voltage, phase, frequency and service as scheduled. All motors 1 HP and larger shall be high efficiency type. Under no circumstance shall the efficiency be less than the 1996 North Carolina Energy Code.

B. Each motor shall be suitable for the brake horsepower of the driven unit, rated with 1.15 minimum service factor, and shall be NEMA design B. The motor temperature rise shall not exceed 72 degrees F for drip proof motors, 90 degrees F for splash proof motors, and 99 degrees F for totally enclosed or explosion proof motors. The motor shall be capable of operating continuously at such temperature rises, and shall be capable of withstanding momentary overloads of 25 percent without injurious overheating.

C. Each item of motor driven equipment shall be furnished complete with the motors, drives and starters as required to perform the specific function for which it is intended, scheduled and specified.

D. Motors shall be ball bearing type selected for quiet operation and shall be manufactured for general purpose duty unless otherwise indicated. Each bearing shall be accessible for lubrication and designed for the load imposed by the V-belt drive or the driven apparatus. Direct drive motors shall be designed for the specific application with all necessary thrust bearings, shaft capacities, etc.

E. Motors larger than 1/2 horsepower shall have bearings with pressure grease lubrications fittings or shall be permanently sealed type.

F. Motors connected to drive equipment by belt shall be furnished with adjustable slide rail bases except for fractional horsepower motors which shall have slotted bases. Motor leads shall be permanently identified and supplied with connectors.

G. Each motor to be installed outdoors shall be of the totally-enclosed fan-cooled type, or housed in a weatherproof housing.

H. Unless otherwise indicated, motors smaller than 1/2 horsepower shall be capacitor start or split phase type designed for 120 volt, single phase, 60 cycle alternating current. Shaded pole motors are not acceptable except 35 watts and smaller. Motor 1/2 horsepower and larger shall be squirrel cage induction type, 3 phase, 60 cycle alternating current.

I. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratio or the load characteristic dictates, the multi-speed motors shall be separate winding types. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed and rated for this duty.

J. If the Contractor proposed to furnish motors varying in horsepower and/or characteristics from those specified, he shall first inform the Engineer of the change and shall then coordinate the change and shall pay all additional charges in connection with the change.

3.4 PROTECTION OF EQUIPMENT

A. Store equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum 4 mil thick plastic shall be fitted to withstand spattering, ground water, precipitation and wind.

B. Plug ends of pipe when work has stopped and close ends of ducts with plastic taped in place until work resumes.

C. Damaged equipment shall be repaired or replaced at the option of the Architect.

3.5 PAINTING

A. Factory painted equipment that has been scratched or marred shall be repainted to match original factory color.

B. All uninsulated black ferrous metal items exposed to sight inside the building, such as piping, equipment hangers and supports not provided with factory prime coat, shall be cleaned and painted with one coat of zinc chromate primer. In addition, such items in finished spaces shall also be painted with two coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.

C. Black ferrous metal items exposed outside the building, such as uninsulated pipe and pipe supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibiting primer and two coats of an asphaltic base aluminum paint. Insulated pipes outside the building shall be cleaned and painted with one coat of rust inhibiting primer before installing insulation.

D. All hanger rods shall be galvanized.

E. No nameplates or equipment shall be painted, and suitable protection shall be afforded to the plates to prevent their being rendered illegible during the painting operation.

3.6 PROTECTION OF EXISTING UTILITIES

A. The Contractor shall use extreme caution during excavation operations not to damage or otherwise interrupt the operations of existing utilities. The Contractor shall be responsible for the continuous operation of these lines and shall provide bypasses or install such shoring, bracing or underpinning as may be required for proper protection.

B. Coordinate all activities around existing utility line with the appropriate utility.

3.7 CUTTING AND PATCHING

A. The Contractor shall assume all cost of, and be responsible for, arranging for all cutting and patching required to complete the installation of his portion of the Work. All cutting shall be carefully and neatly done so as not to damage or cut away more than is necessary of any existing portions of the structure.

B. All surfaces shall be patched to the condition of the adjacent surfaces.

C. The Contractor shall make suitable provisions for adequately waterproofing at his floor penetrations of water proof membrane floors. This shall include but not be limited to floor drains, open sight drains, hub drains, cleanouts, and sleeves for the various piping. This also applies to membrane roofing systems.

D. All penetrations and water proofing of penetrations in membrane roofing systems shall be coordinated with and performed by the manufacturer/installer.

E. Cutting and drilling of precast concrete beam is prohibited.

3.8 SLEEVES, FLOOR AND CEILING PLATES

A. The Contractor shall install, as required, in concrete, carpentry or masonry construction, all necessary hangers, sleeves, expansion bolts, inserts and other fixtures and appurtenances necessary for the support of pipe, duct, equipment and devices furnished under each section of the Specification.

B. Cutting of openings, and installation of sleeves or frames through walls and surfaces shall be done in a neat workmanlike manner. Openings shall be cut only as large as required for the installation; sleeves, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around openings shall be left smooth and finished to match surrounding surface.

C. Where pipes pass through floor slabs, sleeves shall be standard weight black steel pipe with top of sleeve 1 1/2" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage galvanized sheet metal with ends flushed with wall surfaces.

D. Each pipe or duct passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameters one inch larger than the outside dimensions of insulated pipes or ducts.

E. Contractor is responsible for coring of all floors and walls. Coordinate location of cores with existing structure. Do not core through existing beams or joists.

F. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors and roofs are built.

G. All penetrations through rated floors and walls shall be sealed with an UL approved fire stop system as manufactured by 3M, Dow, Proset or Hilti. Install complete firestop system in accordance with manufacturer's instructions. See Attachment A for firestop details.

H. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in approved manner.

I. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to 3/4 inch diameter, and permitting lateral adjustment.

3.9 ESCUTCHEONS

A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls or partitions in finished areas where exposed to view.

B. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these Specifications.

C. Escutcheons shall be split, hanged, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

3.10 CLEANING AND ADJUSTING

A. The Contractor shall provide and install all necessary temporary connections, strainers and other equipment to thoroughly clean the piping systems before start-up. The Contractor is responsible for disposing of all cleaning agents and removing all temporary connections and strainers after cleaning is complete.

B. Remove all stickers, rust, stains, labels and temporary covers before final acceptance.

C. The exterior surfaces of all mechanical equipment, piping, etc., shall be cleaned of all grease, oil, paint, dust and other construction debris.

D. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide written certification of lubrication.

E. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces.

F. Temporary filters shall be provided for fans that are used during construction. At the time of starting the balancing of the air distribution system, new filters shall be installed.

G. Equipment rooms shall be left broom clean.

H. Ends of open pipes shall be covered during construction except when working directly on such end prohibits covering. Cover with minimum four (4) mil thick polyethylene taped, tied or wired in place.

I. Clean and polish identification plates.

3.11 GUARANTEE

A. All systems and components shall be provided with a one year guarantee from the time of final acceptance of beneficial occupancy (Coordinate with the General Conditions). All compressors shall carry a five (5) year warranty. The guarantee shall cover all materials and workmanship. During this guarantee period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring additions to the Contract.

3.12 FOUNDATIONS

A. All concrete foundations required by equipment furnished under the Mechanical Division shall be reinforced and constructed in conformance with the recommendations of the manufacturer of the respective equipment actually applied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch (1") below the equipment bases for alignment, leveling and grouting with non-shrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up right and the equipment shimmed, if necessary. After removal of the forms, the surface of the foundations shall be rubbed. Unless otherwise noted, foundations shall be four inches (4") high and shall extend 6" beyond edge of equipment. All concrete work performed shall conform entirely to the requirements of the General Specifications which describe this class of work.

3.13 INSTALLATION

A. All equipment shall be installed in strict conformance with code requirements and manufacturer's recommendations, as specified herein and as shown. If any conflict arises between these instructions, notify the Architect immediately for guidance.

B. The Contractor shall notify the Owner's representative within five (5) working days of the date required to obtain an inspection of work which is to be concealed. The Contractor shall obtain from the Engineer written confirmation of inspection of all work

to be concealed. If the Contractor fails in his duty to notify the Owner's Representative in a timely manner and work is concealed, he must uncover all concealed areas for inspection at no cost to the Owner.

3.14 ACCESS DOORS

A. Furnish and install access doors at each point required to provide access to concealed valves, cleanouts and other devices requiring operation, adjustment or maintenance. Access doors shall have min. 12 x 12, 16 gauge steel, prime coat finish, with mounting straps, concealed hinges and screwdriver locks, designed for the doors to open 180 degrees.

B. Access doors installed in fire walls or partitions shall be UL labeled to maintain the fire rating of the wall or partition.

3.15 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flame spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50.

B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials", NFPA No. 255, ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc. "Building Materials List" under the heading "Hazard Classification (Fire)".

3.16 HAZARDOUS MATERIALS

A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.

B. Handling of any hazardous material is not covered in this specification division (15). Any requirements for such are beyond the scope of this contract and shall be done only by those persons contracted to do so.

3.17 TESTING PIPE AND DUCT SYSTEMS

A. General. Concealed piping and duct work and insulated piping and ductwork shall be tested in place before concealing or covering. Test shall be conducted in the presence of the Architect or his designated representative. Piping and ductwork located underground shall be tested before backfilling. Equipment, materials and instruments for testing shall be furnished by the Contractor without additional cost to the Owner.

B. Submittals

1. The proposed testing procedures, including test medium and pressure, line segments and equipment included in the test, methods of isolating the test from rest of the system, and pressure monitoring techniques, shall be approved by the Engineer prior to commencement of the test.
2. A detail report of pressure tests on piping and equipment shall be forwarded in duplicate to the Engineer. This report shall show date of test, lines tested, test medium, length of time test pressure was held, pressure drop or rise, and extend of venting or re-pressurizing.

C. Preparatory Work

1. Remove from the system all pumps, traps, shock arrestors, expansion joints, instruments, control valves, safety valves, rupture discs, filters, orifice plates, etc., which might be damaged by the test, or are designated by the Engineer. Also remove all items such as orifice plates which might trap air in a system to be hydrostatically tested. Disconnect all instrument supplies.
2. Open but do not backseat all valves including bypass valves. Lines containing check valves shall have the source of test pressure on the upstream side.
3. Clean system prior to testing. Provide vents and drains as required.
4. Systems may be separated into sub-systems for testing if such action will expedite or simplify the testing.
5. Provide temporary supports where required to prevent over-stressing supports. When tests are completed, remove temporary supports, locks, stops, etc. and set supports for their cold load.

D. Sanitary, Waste and Vent System

1. The hydrostatic test shall be performed before installing fixtures. Water tests shall be applied to each system either in its entirety or in sections. If the test is applied to the entire system, all openings in the piping shall be closed except the highest opening, and the system shall be filled with water and tested with at least a 10 ft. head of water. In testing successive sections, at least the upper 10 ft. of the next preceding section shall be tested so that each joint or pipe in the building except the uppermost 10 ft. of the system has been submitted to a test of at least a 10 ft. head of water. The water shall be kept in the system, or in the portion under test for at least 2 hours before the inspection starts. The system shall be tight at all joints.

E. Domestic Water System

1. The hydrostatic test shall be made upon completion of the roughing-in and before setting fixtures. The entire domestic cold water and hot water, and hot water circulation piping system shall be tested at a hydrostatic pressure of 125 psig and proved tight at this pressure for a period of not less than 2 hours in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.

F. Fire Protection Systems

1. Automatic sprinkler piping shall be tested in accordance with applicable NFPA Standards and as follows. The automatic sprinkler systems shall be hydrostatically tested in their entirety or in zones defined by shut-off valves. The piping shall be tested at a pressure of 200 psig (minimum) measured at the low point in the system or zone, and shall be proved tight at this pressure

for a period of not less than 2 hours. Leaks detected shall be repaired by tightening, re-welding joints or replacing pipe fittings. Caulking of joints will not be permitted.

G. Natural Gas Systems

1. All piping shall be tested pneumatically and proved tight at a pressure of 100 psi for a period of not less than 2 hours. No loss in pressure will be permitted. Leaks detected shall be repaired by tightening, re-welding joints or replacing pipe and fittings. Caulking of joints will not be permitted.

3.18 EXCAVATION, TRENCHING AND BACKFILLING

A. General: The Contractor shall perform all excavation to install piping herein specified. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for back filling shall be removed and disposed of by the Contractor. Grading shall be done to prevent surface water from flowing into trenches and excavations, and any water accumulating therein shall be removed by pumping. All excavation shall be made by open cut. No tunneling shall be done. Trenches shall not be cut below a plane extending at 45 degree angle down and away from any footing.

B. Trench Excavation: The bottom of the trenches shall be graded to provide uniform bearing and support for each section of the piping on undisturbed soil at every point along its entire length, except for the portions of the pipe sections excavated for sealing of pipe joints. Depressions for joints shall be dug after the trench bottom has been graded. Over depths shall be backfilled with loose, granular, moist earth, tamped. Remove unstable soil that is not capable of supporting the pipe and replace with specified material for a minimum depth of 12" below invert of pipe.

C. Backfilling: The trenches shall be backfilled until all specified pressure tests are performed. The trenches shall be backfilled with the excavated materials approved for backfilling consisting of earth, loam, sandy clay, sand and gravel or soft shale, free from large clods of earth and stones, deposited in 6" layers and rammed until the pipe has a cover of not less than the adjacent existing ground, but not greater than 2" above existing ground. The backfilling shall be carried on simultaneously on both sides of the trench so that injurious side pressures do not occur. For all trenches, the compaction of the filled trench shall be at least equal to that of the surrounding undisturbed material, except that trenches occurring in areas to be filled shall be backfilled in 6" maximum layers and each layer compacted to 95% maximum density. Settling the backfill with water will not be permitted. Reopen any trenches not meeting compaction requirements; or where settlement occurs, refill, compact and restore the surface to the grade and compaction specified above, mounded over and smoothed off.

D. Sheeting and Shoring: Furnish, put in place and maintain sheeting and bracing required to support the sides of the excavation and prevent loss of ground which could damage or delay the work or endanger personnel or adjacent structures. All trenches shall be sloped in accordance with OSHA requirements.

END OF SECTION 15010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements for single-phase and poly-phase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. -
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated.

C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 1000 feet (1000 m) above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: **Class F**

J. Code Letter Designation:
1. Motors Smaller than **15** HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Rolled steel for motor frame sizes smaller than **324T**

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS
1. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

B. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.

4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Pre lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 15058

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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.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. Related Sections:

1. Division 5 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 15 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
3. Division 15 Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
4. Division 15 Section(s) **"Metal Ducts"** for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to **ASCE/SEI 7** Section 7-10 .

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe stands.
4. Equipment supports.

1.6 QUALITY ASSURANCE

A. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of **carbon steel**.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of mild steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.4 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.5 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Non staining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured.

Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, **NPS 2-1/2 (DN 65)** and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.

5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for **trapeze pipe hangers 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/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to **1-1/2 inches (40 mm)**

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 **painting Sections.**

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use carbon-steel **pipe hangers and supports metal trapeze pipe hangers and metal framing systems** and attachments for general service applications.

E. Use copper-plated pipe hangers and **copper or stainless-steel** attachments for copper piping and tubing.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
   2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
   3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
   4. Adjustable Band Hangers (MSS Type 9): For suspension of non insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
   5. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non insulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
   6. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
   7. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
   8. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).

9. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
10. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
11. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
12. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

G. system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
   a. .

J. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

K. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

L. Use **powder-actuated fasteners or mechanical-expansion anchors** instead of building attachments where required in concrete construction.

END OF SECTION 15062

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: **Brass, 0.032-inch (0.8-mm) Stainless steel, 0.025-inch (0.64-mm) Aluminum, 0.032-inch (0.8-mm)or anodized aluminum, 0.032-inch (0.8-mm)** minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel **rivets or self-tapping screws**.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/8 inch (3.2 mm)** thick, and having predrilled holes for attachment hardware.
2. Letter Color: **White**.
3. Background Color: **Black**.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel **rivets or self-tapping screws**.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** thick, and having predrilled holes for attachment hardware.

B. Letter Color: **White**.

C. Background Color: **Black**.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel **rivets or self-tapping screws**.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to **cover full** circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Shall not be used .

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.4 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** thick, and having predrilled holes for attachment hardware.

B. Letter Color: **White**.

C. Background Color: **Black** .

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel [**rivets**] [**rivets or self-tapping screws**] [**self-tapping screws**].

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.5 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches (32 mm) for ducts; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: **Fiberboard or metal**.
2. Stencil Paint: Exterior, gloss, **alkyd enamel** black unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, **alkyd enamel** in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: **Brass, 0.032-inch (0.8-mm) anodized aluminum, 0.032-inch (0.8-mm)**] minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass **wire-link or beaded chain; or S-hook**.

3. Valve-tag schedule shall be included in operation and maintenance data.

2.7 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: **Approximately 4 by 7 inches (100 by 178 mm)**]
2. Fasteners: **Brass grommet and wire**.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulating materials.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 9 Section "**Interior Painting**."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels **with painted, color-coded bands or rectangles, complying with ASME A13.1,** on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 **feet (7.5 m)** along each run. Reduce intervals to **10 feet (3.0 m)**] in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

a. >.

2. Refrigerant Piping:

a. Background Color: **White**.
b. Letter Color: **Red**.

3.4 DUCT LABEL INSTALLATION

A. Install **self-adhesive** duct labels with permanent adhesive on air ducts in the following color codes:

1. **Blue** For cold-air supply ducts.
2. **Yellow** : For hot-air supply ducts.
3. **Green** For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch (25 mm) high is needed for proper identification because of distance from normal location of required identification.

C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of **25 feet (7.5 m)**] in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:
   a. Refrigerant: **1-1/2 inches (38 mm)square**
   b. Hot Water: **1-1/2 inches (38 mm) square** .
   c. Gas: **1-1/2 inches (38 mm)**.

2. Valve-Tag Color:
   a. Refrigerant: **Green** .
   b. Hot Water: **Natural**.
   c. Gas: **Yellow**.

3. Letter Color:
   a. Refrigerant: **White** .
   b. Hot Water: **Black**.
   c. Gas: [**Black** .

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 15077

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:

a. Calcium silicate.
b. Cellular glass.
c. Flexible elastomeric.
d. Mineral fiber.
e. Phenolic.
f. Polyisocyanurate.
g. Polyolefin.
h. Polystyrene.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Factory-applied jackets.
9. Field-applied fabric-reinforcing mesh.
10. Field-applied cloths.
11. Field-applied jackets.
12. Tapes.
13. Securements.
14. Corner angles.

B. Related Sections:

1. Division 2 Section "Hydronic Distribution" for loose-fill pipe insulation in underground piping outside the building.
2. Division 2 Section "Steam Distribution" for loose-fill pipe insulation in underground piping outside the building.
3. Division 15 Section "Fire-Suppression Systems Insulation."
4. Division 15 Section "Plumbing Insulation."
5. Division 15 Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Adhesives Submittal:

1. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

C. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

D. Qualification Data: For qualified Installer.

E. Material Test Reports: Factory test reports .

F. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 15 Section "Hangers and Supports."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Products shall not contain asbestos, lead, mercury, or mercury compounds.

B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Aeroflex USA Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type **I**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. CertainTeed Corp.; Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Duct Wrap.

d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; All-Service Duct Wrap.

E. High-Temperature, Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type V, without factory-applied jacket.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Johns Manville; HTB 23 Spin-Glass.
b. Owens Corning; High Temperature Flexible Batt Insulations.

2.

F. Phenolic:

G. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Armacell LLC; Tubolit.
b. Nomaco Inc.; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.
c. RBX Corporation; Therma-cell.

H. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K) after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Dow Chemical Company (The); Styrofoam.
b. Knauf Insulation; Knauf Polystyrene.
c. <**Insert manufacturer's name; product name or designation.**>

2.2 FIRE-RATED INSULATION SYSTEMS

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F (10 to 427 deg C).

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Childers Products, Division of ITW; CP-97.

b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
c. Marathon Industries, Inc.; 290.
d. Mon-Eco Industries, Inc.; 22-30.
e. Vimasco Corporation; 760.

2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Dow Chemical Company (The); 739, Dow Silicone.
b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Speedline Vinyl Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Polystyrene Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Childers Products, Division of ITW; CP-70.
b. Foster Products Corporation, H. B. Fuller Company; 30-45/30-46.
c. Marathon Industries, Inc.; 405.
d. Mon-Eco Industries, Inc.; 44-05.
e. Vimasco Corporation; 750.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
5. Color: White or gray.

6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:

2.5 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
   b. Compac Corp.; 104 and 105.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

   a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
   b. Compac Corp.; 130.
   c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
   d. Venture Tape; 1506 CW NS.

2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
b. Compac Corp.; 120.
c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

   a. Childers Products; Bands.
   b. PABCO Metals Corporation; Bands.
   c. RPR Products, Inc.; Bands.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type **304 or Type 316**; 0.015 inch (0.38 mm) thick, [**1/2 inch (13 mm)**] [**3/4 inch (19 mm)**] wide with **wing seal**.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, [**0.106-inch- (2.6-mm-)**] [**0.135-inch- (3.5-mm-)**] diameter shank, length to suit depth of insulation indicated.

   a. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; CD.
      3) Midwest Fasteners, Inc.; CD.
      4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, [**0.106-inch- (2.6-mm-)**] [**0.135-inch- (3.5-mm-)**] diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.

   a. Products: Subject to compliance with requirements, **available products that may be incorporated into the Work include, but are not limited to, the following**:

      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; Cupped Head Weld Pin.
      3) Midwest Fasteners, Inc.; Cupped Head.
      4) Nelson Stud Welding; CHP.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

D. Wire: [**0.080-inch (2.0-mm) nickel-copper alloy 0.062-inch (1.6-mm) soft-annealed, stainless steel 0.062-inch (1.6-mm) soft-annealed, galvanized steel**.

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. C & F Wire.
b. Childers Products.
c. PABCO Metals Corporation.
d. RPR Products, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install 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 **2 inches (50 mm)** o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Hand holes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

1. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems" for fire stopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
2. Pipe: Install insulation continuously through floor penetrations.
3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

5.
6. Install insulation to flanges as specified for flange insulation application.

3.6 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 9 painting Sections.

1. Flat Acrylic Finish: **Two** finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to **one** location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
2.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in non conditioned space.
4. Indoor, exposed return located in non conditioned space.
5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
6.
7.

8.
9. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
10. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
11. Outdoor, concealed supply and return.
12. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

1.

B. Concealed, rectangular, supply-air duct insulation shall be **one of** the following:
1. Mineral-Fiber Blanket: **1-1/2 inches (38 mm)** thick and **0.75-lb/cu. ft. (12-kg/cu. m)** nominal density.

C. Concealed, rectangular, return-air duct insulation shall be **one of** the following:
1. Mineral-Fiber Blanket: **1-1/2 inches (38 mm)** thick and **0.75-lb/cu. ft. (12-kg/cu. m)** nominal density.

D. Concealed, rectangular, outdoor-air duct insulation shall be **one of** the following:
1. Mineral-Fiber Blanket: **1-1/2 inches (38 mm** thick and **0.75-lb/cu. ft. (12-kg/cu. m** nominal density.

E. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior shall be **one of** the following:
1. Mineral-Fiber Blanket: **1-1/2 inches (38 mm** thick and **0.75-lb/cu. ft. (12-kg/cu. m** nominal density.

END OF SECTION 15083

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Bronze angle valves.
2. Brass ball valves.
3. Bronze ball valves.
4. Bronze lift check valves.
5. Bronze swing check valves.
6. Bronze gate valves.
7. Bronze globe valves.
8. Lubricated plug valves.
9. Eccentric plug valves.

B. Related Sections:

1. Division 15 HVAC piping Sections for specialty valves applicable to those Sections only.
2. Division 15 Section "Identification for HVAC Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Non rising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

1.6 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 angle, gate, and globe 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 valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures by the equipment manufacturer.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
1. Hand lever: For quarter-turn valves NPS 6 (DN 150) and smaller **except plug valves**.
2. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every **5** plug valves, for each size square plug-valve head.

E. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

F. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:

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. Hammond Valve.
b. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Hand wheel: Malleable iron.

B. Class 125, Bronze Angle Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. American Valve, Inc.
b. NIBCO INC.
c. Crane Co >.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

C. Class 150, Bronze Angle Valves with Bronze Disc:

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**:

D.

a. Crane Co.; Crane Valve Group; Stockham Division.
b. Kitz Corporation.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron .

E. Class 150, Bronze Angle Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Powell Valves.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron.

2.3 BRASS BALL VALVES

A. One-Piece, Reduced-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Kitz Corporation.

b. <**Insert manufacturer's name**>.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Forged brass.
e. Ends: Threaded.
f. Seats: PTFE or TFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Reduced.

B. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. DynaQuip Controls.
d. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
e. Hammond Valve.
f. Jamesbury; a subsidiary of Metso Automation.
g. Jomar International, LTD.
h. Kitz Corporation.
i. Legend Valve.
j. Marwin Valve; a division of Richards Industries.
k. Milwaukee Valve Company.
l. NIBCO INC.
m. Red-White Valve Corporation.
n. RuB Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full.

C. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Flow-Tek, Inc.; a subsidiary of Bray International, Inc.
d. Hammond Valve.
e. Jamesbury; a subsidiary of Metso Automation.
f. Kitz Corporation.
g. Marwin Valve; a division of Richards Industries.
h. Milwaukee Valve Company.
i. RuB Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

D. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:

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. Hammond Valve.
b. Jamesbury; a subsidiary of Metso Automation.
c. Legend Valve.
d. Marwin Valve; a division of Richards Industries.
e. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Regular.

E. Two-Piece, Regular-Port, Brass Ball Valves with Stainless-Steel Trim:

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. Jamesbury; a subsidiary of Metso Automation.
   b. Marwin Valve; a division of Richards Industries.

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig (1035 kPa).
   c. CWP Rating: 600 psig (4140 kPa).
   d. Body Design: Two piece.
   e. Body Material: Brass or bronze.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Stainless steel.
   i. Ball: Stainless steel, vented.
   j. Port: Regular.

F. Three-Piece, Full-Port, Brass Ball Valves with Brass Trim:

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. Jomar International, LTD.
   b. Kitz Corporation.
   c. Red-White Valve Corporation.
   d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   e. <**Insert manufacturer's name**>.

2. Description:

   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig (1035 kPa).
   c. CWP Rating: 600 psig (4140 kPa).
   d. Body Design: Three piece.
   e. Body Material: Forged brass.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Brass.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

G. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

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. Jomar International, LTD.

b. Kitz Corporation.
c. Marwin Valve; a division of Richards Industries.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
e. <**Insert manufacturer's name**>.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Three piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.4 BRONZE BALL VALVES

A. One-Piece, Reduced-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 400 psig (2760 kPa).
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE or TFE.
g. Stem: Bronze.
h. Ball: Chrome-plated brass.
i. Port: Reduced.

B. One-Piece, Reduced-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, **manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

a. Conbraco Industries, Inc.; Apollo Valves.
b. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: One piece.
d. Body Material: Bronze.
e. Ends: Threaded.
f. Seats: PTFE or TFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Reduced.

C. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

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. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Hammond Valve.
e. Lance Valves; a division of Advanced Thermal Systems, Inc.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Red-White Valve Corporation.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

D. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

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. Conbraco Industries, Inc.; Apollo Valves.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Hammond Valve.
d. Lance Valves; a division of Advanced Thermal Systems, Inc.
e. Milwaukee Valve Company.
f. NIBCO INC.

g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

E. Two-Piece, Regular-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. DynaQuip Controls.
f. Hammond Valve.
g. Lance Valves; a division of Advanced Thermal Systems, Inc.
h. Milwaukee Valve Company.
i. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Regular.

F. Two-Piece, Regular-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Conbraco Industries, Inc.; Apollo Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Hammond Valve.
d. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Regular.

G. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

a. Conbraco Industries, Inc.; Apollo Valves.
b. DynaQuip Controls.
c. Hammond Valve.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Red-White Valve Corporation.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

H. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Conbraco Industries, Inc.; Apollo Valves.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.

b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.5 IRON BALL VALVES

A. Class 125, Iron Ball Valves:

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. American Valve, Inc.
   b. Conbraco Industries, Inc.; Apollo Valves.
   c. Kitz Corporation.
   d. Sure Flow Equipment Inc.
   e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   f. <**Insert manufacturer's name**>.

2. Description:

   a. Standard: MSS SP-72.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Design: Split body.
   d. Body Material: ASTM A 126, gray iron.
   e. Ends: Flanged.
   f. Seats: PTFE or TFE.
   g. Stem: Stainless steel.
   h. Ball: Stainless steel.
   i. Port: Full.

3. 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. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
   b. American Valve, Inc.
   c. Conbraco Industries, Inc.; Apollo Valves.

2.6 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

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. American Valve, Inc.
    b. Crane Co.; Crane Valve Group; Crane Valves.
    c. Crane Co.; Crane Valve Group; Jenkins Valves.
    d. Crane Co.; Crane Valve Group; Stockham Division.
    e. Hammond Valve.
    f. Kitz Corporation.
    g. Milwaukee Valve Company.
    h. NIBCO INC.
    i. Powell Valves.
    j. Red-White Valve Corporation.
    k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    l. Zy-Tech Global Industries, Inc.

2. Description:

    a. Standard: MSS SP-80, Type 3.
    b. CWP Rating: 200 psig (1380 kPa).
    c. Body Design: Horizontal flow.
    d. Body Material: ASTM B 62, bronze.
    e. Ends: Threaded.
    f. Disc: Bronze.

B. Class 150, Bronze Swing Check Valves with Bronze Disc:

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. American Valve, Inc.
    b. Crane Co.; Crane Valve Group; Crane Valves.
    c. Crane Co.; Crane Valve Group; Jenkins Valves.
    d. Crane Co.; Crane Valve Group; Stockham Division.
    e. Kitz Corporation.
    f. Milwaukee Valve Company.
    g. NIBCO INC.
    h. Red-White Valve Corporation.
    i. Zy-Tech Global Industries, Inc.

2. Description:

    a. Standard: MSS SP-80, Type 3.
    b. CWP Rating: 300 psig (2070 kPa).
    c. Body Design: Horizontal flow.
    d. Body Material: ASTM B 62, bronze.
    e. Ends: Threaded.
    f. Disc: Bronze.
    g. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).

3. Manufacturers: Subject to compliance with requirements, **manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

2.7 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

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. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Zy-Tech Global Industries, Inc.
m. <**Insert manufacturer's name**>.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded[**or solder joint**].
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron[**, bronze, or aluminum**].

B. Class 125, RS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, **manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.

i. Powell Valves.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
k. Zy-Tech Global Industries, Inc.
l. <**Insert manufacturer's name**>.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded[**or solder joint**].
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron**, bronze, or aluminum**.

C. Class 150, NRS Bronze Gate Valves:

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. Hammond Valve.
b. Kitz Corporation.
c. Milwaukee Valve Company.
d. NIBCO INC.
e. Powell Valves.
f. Red-White Valve Corporation.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron[**, bronze, or aluminum**].

D. Class 150, RS Bronze Gate Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. Hammond Valve.
d. Kitz Corporation.
e. Milwaukee Valve Company.

f. NIBCO INC.
g. Powell Valves.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
i. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron[**, bronze, or aluminum**].

2.8 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Flo Fab Inc.
e. Hammond Valve.
f. Kitz Corporation.
g. Legend Valve.
h. Milwaukee Valve Company.
i. NIBCO INC.
j. Powell Valves.
k. Red-White Valve Corporation.
l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
m. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-70, Type I.
b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged.
f. Trim: Bronze.
g. Disc: Solid wedge.
h. Packing and Gasket: Asbestos free.

B. Class 125, OS&Y, Iron Gate Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Flo Fab Inc.
   e. Hammond Valve.
   f. Kitz Corporation.
   g. Legend Valve.
   h. Milwaukee Valve Company.
   i. NIBCO INC.
   j. Powell Valves.
   k. Red-White Valve Corporation.
   l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   m. Zy-Tech Global Industries, Inc.

2. Description:

   a. Standard: MSS SP-70, Type I.
   b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
   c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
   d. Body Material: ASTM A 126, gray iron with bolted bonnet.
   e. Ends: Flanged.
   f. Trim: Bronze.
   g. Disc: Solid wedge.
   h. Packing and Gasket: Asbestos free.

C. Class 250, NRS, Iron Gate Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. NIBCO INC.

2. Description:

   a. Standard: MSS SP-70, Type I.
   b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
   c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
   d. Body Material: ASTM A 126, gray iron with bolted bonnet.
   e. Ends: Flanged.
   f. Trim: Bronze.
   g. Disc: Solid wedge.
   h. Packing and Gasket: Asbestos free.

D. Class 250, OS&Y, Iron Gate Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Powell Valves.
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

   a. Standard: MSS SP-70, Type I.
   b. NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
   c. NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
   d. Body Material: ASTM A 126, gray iron with bolted bonnet.
   e. Ends: Flanged.
   f. Trim: Bronze.
   g. Disc: Solid wedge.
   h. Packing and Gasket: Asbestos free.

2.9 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

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. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. Hammond Valve.
   d. Kitz Corporation.
   e. Milwaukee Valve Company.
   f. NIBCO INC.
   g. Powell Valves.
   h. Red-White Valve Corporation.
   i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   j. Zy-Tech Global Industries, Inc.

2. Description:

   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded[**or solder joint**].
   e. Stem and Disc: Bronze.
   f. Packing: Asbestos free.
   g. Handwheel: Malleable iron**, bronze, or aluminum**.

B. Class 125, Bronze Globe Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, **manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Stockham Division.
   c. NIBCO INC.
   d. Red-White Valve Corporation.
   e. <**Insert manufacturer's name**>.

2. Description:

   a. Standard: MSS SP-80, Type 2.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded[**or solder joint**].
   e. Stem: Bronze.
   f. Disc: PTFE or TFE.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron[**, bronze, or aluminum**].

C. Class 150, Bronze Globe Valves with Nonmetallic Disc:

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. Crane Co.; Crane Valve Group; Crane Valves.
   b. Hammond Valve.
   c. Kitz Corporation.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
   f. Powell Valves.
   g. Red-White Valve Corporation.
   h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   i. Zy-Tech Global Industries, Inc.

2. Description:

   a. Standard: MSS SP-80, Type 2.
   b. CWP Rating: 300 psig (2070 kPa).
   c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
   d. Ends: Threaded.
   e. Stem: Bronze.
   f. Disc: PTFE or TFE.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron[**, bronze, or aluminum**].

2.10 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Kitz Corporation.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Powell Valves.
i. Red-White Valve Corporation.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
k. Zy-Tech Global Industries, Inc.

2. Description:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

B. Class 250, Iron Globe Valves:

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. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 500 psig (3450 kPa).
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. **Center-Guided and Plate-Type** Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly**, or gate** valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.

3. Throttling Service except Steam: **Globe, ball, or butterfly** valves.
4. Pump-Discharge Check Valves:

    a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with [**bronze d**isc.
    b. NPS 2-1/2 (DN 65) and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, **metal** seat check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
4. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.
7. For Grooved-End [**Copper Tubing**] [**and**] [**Steel Piping**] except Steam and Steam Condensate Piping: Valve ends may be grooved.
8. Iron Ball Valves, NPS 2-1/2 to NPS 10 (DN 65 to DN 250): Class 150.
9. High-Performance Butterfly Valves: [**Class 150**] [**Class 300**], single flange.

END OF SECTION 15112

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes packaged, **water**-cooled air-conditioning units with refrigerant compressors and controls intended for indoor installations.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. LEED Submittals:

1. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
2. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2004, Section 5 - "Systems and Equipment."

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Operation and Maintenance Data: For self-contained air conditioners to include in emergency, operation, and maintenance manuals.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ARI Compliance:

1. Applicable requirements in ARI 210/240.
2. Applicable requirements in ARI 340/360.
3. Applicable requirements in ARI 390.

C. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of self-contained air conditioners that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: **Five** year(s) from date of Substantial Completion.
b. For Parts: **Five** year(s) from date of Substantial Completion.
c. For Labor: **Five** year(s) from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: **One** set(s) of filters for each unit.
2. Fan Belts: **One** set(s) of belts for each unit.
3. Gaskets: **One** set(s) for each access door.
4. Fuses: **One** set(s) for each air-handling unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:

B. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated on Drawings** or comparable product by one of the following:

1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. Engineered Air.
3. McQuay International.
4. Trane Inc.

2.2 PACKAGED UNITS

A. Description: Factory assembled, wired, and tested; and fully charged with refrigerant and oil.

B. Configuration: Horizontal, ceiling-**plenum** mounted.

C. Disconnect Switch: Factory mounted **on cabinet**.

2.3 CABINET

A. Frame and Panels: Structural-steel frame with galvanized-steel panels and access doors or panels.

1. Exterior-Surface Finish: Factory painted in color selected by Architect.
2. Interior-Surface Finish: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

B. Insulation: 1-inch- (25-mm-) thick, glass-fiber duct liner complying with ASTM C 1091 and having a microbial coating on cabinet interior and control panel. 1/2-inch- (13-mm-) thick liner is acceptable for units smaller than 15 tons (50 kW).

C. Return-Air Opening: Rear, [**open**] [**flange for duct connection**].

D. Corrosion-Resistant Treatment: Phenolic coating on unit interior and exterior.

2.4 SUPPLY-AIR FAN

A. Fan Material: Galvanized steel.

B. Configuration: Double-width, double-inlet, [**forward-curved**] [**airfoil**] centrifugal fan; statically and dynamically balanced. [**Vertical**] [**Horizontal**] discharge with flexible discharge collar.

C. Drive: **Direct, with fan and motor resiliently mounted**.

D. Fan Sheaves: Variable pitch, dynamically balanced, bored to fit shafts, and keyed for initial startup.

E. Motor Sheave: Variable and adjustable pitch, dynamically balanced, and selected to achieve specified rpm when set at mid position.

F. Belt Rating: As recommended by manufacturer or a minimum of one and one-half times nameplate rating of motor.

G. Bearings: Grease lubricated with grease lines extended to exterior of unit **with L-50 life at 200,000 hours**.

H. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for HVAC Equipment."

1. Special Motor Features: Premium efficiency, as defined in Division 15 Section "Common Motor Requirements for HVAC Equipment."

I. Isolation: Mount fan and motor on common subbase and mount assembly on spring isolators with minimum static deflection of **1 inch (25 mm)** .

J. Outdoor-Air-Intake Accessories:

1. Barometric Outdoor-Air Damper: Adjustable-blade damper allowing induction of up to 25 percent outdoor air when evaporator fan is running.
2. Motorized Outdoor-Air Damper: Motorized, two-position blade damper allowing induction of up to 25 percent outdoor air; with spring-return, low-voltage damper motor.
3. Energy-Recovery Ventilator: Assembly of desiccant-coated, heat-recovery wheels and centrifugal exhaust fans to transfer approximately 67 percent of the difference between the sensible and latent heat of outdoor and exhaust air.
4. Air-Side Economizer: Damper assembly allowing induction of up to 100 percent outdoor air to maintain a selected mixed-air temperature; and exhaust damper and spring-return, low-voltage, modulating damper motor with minimum position adjustment.

2.5 REFRIGERATION SYSTEM

A. Compressor: Scroll type, hermetically sealed, 3600 rpm maximum, and resiliently mounted with positive lubrication and internal motor protection.

B. Refrigerant Coils (Indoor Units): Seamless copper tubes expanded into aluminum fins.

1. Corrosion-Resistant Treatment: Phenolic coating applied with multiple dips and baked.
2. Refrigerant Circuits: A separate circuit for each compressor, with externally equalized thermal-expansion valve **with adjustable superheat**, filter dryer, **sight glass, high-pressure relief valve,** and charging valves.
3. Mount coil assembly over stainless-steel drain pan **complying with ASHRAE 62.1-2004 and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir**.
4. Refrigerant: R-410A.
5. Expansion valve with replaceable thermostatic element.
6. Refrigerant dryer.
7. High-pressure switch.
8. Low-pressure switch.
9. Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
10. Low ambient temperature switch.
11. Brass service valves installed in discharge and liquid lines.

C. Water-Cooled Condenser:

1. Description: Factory assembled and tested; tube in tube coaxial type with water-regulating valve.
2. Tubing: **Copper** inner tube; refrigerant and water-side leak tested to 400 psig (2760 kPa) underwater.

D. Water-Side Economizer Section:

1. Description: Factory assembled and tested; consisting of water coil, modulating valves, controls, piping with cleanouts, and access panels.
2. Water Coil: **Two** or **Four**] rows, copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), and **copper** headers; leak tested to 300 psig (2070 kPa) underwater; and having a two-position control valve.

2.6 HEATING COIL

A. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm); leak tested to 300 psig (2070 kPa) underwater; and having a two-position control valve.

B. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow-proving device; and one-time fuses in terminal box for overcurrent protection.

2.7 CONTROLS

A. Control equipment and sequence of operation are specified in Division 15 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

B. Control Package: Factory wired, including contactor, high - and low-pressure cutouts, internal-winding thermostat for compressor, control-circuit transformer, and non-cycling reset relay.

C. Time-Delay Relay: Five-minute delay to prevent compressor cycling.

D. Adjustable Thermostat: **Remote** to control the following:

1. Supply fan.
2. Compressor.
3. Condenser.
4. Hot-water coil valve.
5. Electric heater.
6. Thermost shall be programmable 7 day flush mount with two stage heat and two stage cooling modes.

E. System Selector Switch: [**Heat-off-cool**] [**Off-heat-auto-cool**].

F. Fan Control Switch: Auto-on.

G. Time Clock: Cycle unit on and off.

H. Microprocessor Control Panel: Controls unit functions as standalone or network operation, including refrigeration and safety controls, with unit-mounted display, and the following:

1. Supply fan.
2. Supply-fan motor speed.
3. Compressors.
4. Air-cooled condenser.
5. Cooling tower pump.
6. Modulating, hot-water coil valve.
7. Multistep, electric heater.
8. Time-of-day control to cycle unit on and off.
9. Night-heat, morning warm-up cycle.
10. Economizer control.
11. Panel-mounted control switch to operate unit in remote or local control mode or to stop or reset.
12. Panel-mounted indication of the following:

    a. Operating status.
    b. System diagnostics and safety alarms.
    c. Supply-air temperature set point.
    d. Zone heating-temperature set point.
    e. Supply-air pressure set point.
    f. Economizer minimum position set point.
    g. Supply-air-pressure, high-limit set point.
    h. Monitor constant and variable motor loads.
    i. Monitor variable-frequency drive operation.
    j. Monitor economizer cycle.
    k. Monitor cooling load.

l. Monitor air distribution static pressure and ventilation air volumes.

2.8 CAPACITIES AND CHARACTERISTICS

A. Cooling Capacity:

1. Total: as scheduled on the drawings **Btu/h** .
2. Seasonal Energy Efficiency Ratio: as scheduled on the drawings .

B. Heating Capacity:

1. Total: as scheduled on the drawings
2. Heat Pump:

a. Coefficient of Performance: As scheduled on the drawings

C. Supply-Air Fan:

1. As scheduled on the drawings

D. Water-Cooled Condenser:

1. Entering-Water Temperature: As scheduled on the drawings.
2. Water Flow: As scheduled on the drawings.>.
3. Water Pressure Drop: As scheduled on the drawings.**feet of head (kPa)**>.

E. Filters:

1. Final Filter:

a. Type: 1” thick fiber glass disposable filter panel.

F. Accessories:

1. Manual outdoor-air damper.
2. Manual return air damper.
3. Air Pressure Switch: Indicates when differential pressure exceeds set point representing dirty filters.

G. Single-Point Electrical Characteristics:

1. Volts: **277 volts**
2. Phase: **Single**.
3. Hertz: 60.
4. Full-Load Amperes: As scheduled on the drawings..
5. Maximum Overcurrent Protection: As scheduled on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Anchor units support to structure.

C. Install seismic restraints.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Water Coil Connections: Comply with requirements in Division 15 Section "Hydronic Piping." Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
2. Water-Cooled Condenser Connections: " Connect to supply and return with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.

B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

C. Duct Connections: Duct installation requirements are specified in Division 15 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply[**and return**] ducts to self-contained air conditioners with flexible duct connectors. Flexible duct connectors are specified in Division 15 Section "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation, and inspect for refrigerant leaks.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Units will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. **Engage a factory-authorized service representative to perform** startup service.

3.5 DEMONSTRATION

A. **Engage a factory-authorized service representative to train** Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 158119

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Sheet metal materials.
3. Duct liner.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.

B. Related Sections:

1. Division 15 Section "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
2. Division 15 Section "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
3. Division 15 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.
4. Division 15 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing requirements for metal ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports **and seismic restraints** shall withstand the effects of gravity **and seismic** loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" **and ASCE/SEI 7**

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment [**, seismic restraints,**] and vibration isolation.
13. Show coordination with other trades**.**

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

D. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

E. Welding certificates.

F. Burn Permits and welding permits

G. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to [**AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.**] [**AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.**] [**AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.**]

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Provide turning vanes in all “Tees” and duct elbows greater than 45° comply with all relevant SMACNA requirements.

2.2 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: [**G60 (Z180)**] [**G90 (Z275)**].
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

3. Galvanized Coating Designation: [**G60 (Z180)**] [**G90 (Z275)**].
4. Minimum Thickness for Factory-Applied PVC Coating: 4 mils (0.10 mm) thick[**on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil (0.025 mm) thick on opposite surface**].
5. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: **White**.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

1.

2.

2.3 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: **3 inches (76 mm)**.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive or negative.
10. Service: Indoor or outdoor.
11. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.5 SEISMIC-RESTRAINT DEVICES

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. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Ductmate Industries, Inc.
3. Hilti Corp.
4. Kinetics Noise Control.
5. Loos & Co.; Cableware Division.
6. Mason Industries.
7. TOLCO; a brand of NIBCO INC.
8. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by **an agency acceptable to authorities having jurisdiction**.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least **four** times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: **ASTM A 603, galvanized**-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: **Steel tube or steel slotted-support-system sleeve with internally bolted connections** to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round[**and flat-oval**] ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 15 Section "Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. **Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."**

3.2 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.4 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with **SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."**

1. Space lateral supports a maximum of **40 feet (12 m)** o.c., and longitudinal supports a maximum of **80 feet (24 m)** o.c.
2. Brace a change of direction longer than 12 feet (3.7 m).

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by [**an evaluation service member of the ICC Evaluation Service**] [**the Office of Statewide Health Planning and Development for the State of California**] [**an agency acceptable to authorities having jurisdiction**].

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre stressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 15 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 9 painting Sections.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
   a. Supply Ducts with a Pressure Class of **2-Inch wg (500 Pa)** or Higher: Test representative duct sections totaling no less than **50** percent of total installed duct area for each designated pressure class.
   b. Return Ducts with a Pressure Class of **2-Inch wg (500 Pa)** or Higher: Test representative duct sections**,** totaling no less than **50** percent of total installed duct area for each designated pressure class.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give **seven** days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
   a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 DUCT CLEANING

A. Clean **new and existing** duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 15 Section "Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.9 START UP

A. Air Balance: Comply with requirements in Division 15 Section "Testing, Adjusting, and Balancing."

3.10 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive **-inch wg (250 Pa) 2-inch wg (500 Pa)**.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **12**.
d. SMACNA Leakage Class for Round and Flat Oval: **12**.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units

a. Pressure Class: Positive or negative **1-inch wg (250 Pa)**.
b. Minimum SMACNA Seal Class: **A**
c. SMACNA Leakage Class for Rectangular: **12**
d. SMACNA Leakage Class for Round and Flat Oval: **12** .

2. Ducts Connected to Air-Handling Units :

a. Pressure Class: Positive or negative **2-inch wg (500 Pa)**.
b. Minimum SMACNA Seal Class: **A**.
c. SMACNA Leakage Class for Rectangular: **6**
d. SMACNA Leakage Class for Round and Flat Oval: **6**.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

a. Pressure Class: Negative **1-inch wg (250 Pa)**.
b. Minimum SMACNA Seal Class: **A** if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: **12**
d. SMACNA Leakage Class for Round and Flat Oval: **6**

2. Ducts Connected to Air-Handling Units :

a. Pressure Class: Positive or negative **2-inch wg (500 Pa)** .
b. Minimum SMACNA Seal Class: **A** if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: **6**.

3. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."

4. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows,**12 Inches (305 mm)** and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, **14 Inches (356 mm)** and Larger in Diameter: **Standing seam** .

E. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap.
c. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.

END OF SECTION 15815

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling dampers.
7. Smoke dampers.
8. Combination fire and smoke dampers.
9. Corridor dampers.
10. Flange connectors.
11. Duct silencers.
12. Turning vanes.
13. Remote damper operators.
14. Duct-mounted access doors.
15. Flexible connectors.
16. Flexible ducts.
17. Duct security bars.
18. Duct accessory hardware.

B. Related Sections:

1. Division 13 Section "Fire Alarm" for duct-mounted fire and smoke detectors.
2. Division 15 Section "Intake and Relief Ventilators" for roof-mounted ventilator caps.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Wiring Diagrams: For power, signal, and control wiring.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

D. Source quality-control reports.

E. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA 500-D testing for damper rating.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to **10** percent of amount installed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: **G60 (Z180)**] [**G90 (Z275)**.
2. Exposed-Surface Finish: Mill phosphatized.

C. Extruded Aluminum: Comply with ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

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. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Duro Dyne Inc.
5. Greenheck Fan Corporation.
6. Lloyd Industries, Inc.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. Pottorff; a division of PCI Industries, Inc.
10. Ruskin Company.
11. SEMCO Incorporated.
12. Vent Products Company, Inc.

B. Description: Gravity balanced.

C. Maximum Air Velocity: **2000 fpm (10 m/s)**.

D. Maximum System Pressure: **1-inch wg (0.25 kPa)**.

E. Frame: **0.052-inch- (1.3-mm-) thick, galvanized sheet steel**, with welded corners **and mounting flange**.

F. Blades: Multiple single-piece blades,[c**enter-pivoted,** maximum 6-inch (150-mm) width, **0.025-inch- (0.6-mm- thick, roll-formed aluminum** [**0.050-inch- (1.2-mm-) thick aluminum sheet** with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: **Felt**.

I. Blade Axles:

1. Material: **Nonferrous metal**.
2. Diameter: **0.20 inch (5 mm)**.

J. Tie Bars and Brackets: **Galvanized steel**.

K. Return Spring: Adjustable tension.

L. Bearings: **Steel ball**.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.
4. Chain pulls.
5. Screen Mounting: Front mounted in sleeve.

   a. Sleeve Thickness: 20-gage (1.0-mm) minimum.
   b. Sleeve Length: 6 inches (152 mm) minimum.
6. Screen Material: **Galvanized steel**.
7. Screen Type: **Bird**.
8. 90-degree stops.

2.3 BAROMETRIC RELIEF DAMPERS

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. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Duro Dyne Inc.
5. Greenheck Fan Corporation.
6. Lloyd Industries, Inc.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. Pottorff; a division of PCI Industries, Inc.
10. Ruskin Company.
11. SEMCO Incorporated.
12. Vent Products Company, Inc.

B. Suitable for horizontal or vertical mounting.

C. Maximum Air Velocity: **2000 fpm (10 m/s)**.

D. Maximum System Pressure: 2-inch wg (0.5 kPa) .

E. Frame: **0.064-inch- (1.6-mm-) thick, galvanized sheet steel 0.063-inch- (1.6-mm-) thick extruded aluminum**, with welded corners **and mounting flange**.

F. Blades:

1. Multiple, **0.025-inch- (0.6-mm-) thick, roll-formed aluminum**.
2. Maximum Width: 6 inches (150 mm).
3. Action: Parallel.
4. Balance: Gravity.
5. Eccentrically pivoted.

G. Blade Seals: **Vinyl**.

H. Blade Axles: **Galvanized steel**.

I. Tie Bars and Brackets:

1. Materia **Galvanized**.
2. Rattle free with 90-degree stop.

J. Return Spring: Adjustable tension.

K. Bearings: **Synthetic**.

L. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressures.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

a. Air Balance Inc.; a division of Mestek, Inc.
b. American Warming and Ventilating; a division of Mestek, Inc.
c. Flexmaster U.S.A., Inc.
d. McGill AirFlow LLC.
e. METALAIRE, Inc.
f. Nailor Industries Inc.
g. Pottorff; a division of PCI Industries, Inc.
h. Ruskin Company.
i. Trox USA Inc.
j. Vent Products Company, Inc.

2. Standard leakage rating[**, with linkage outside airstream**].
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Hat-shaped, **galvanized** steel channels, 0.064-inch (1.62-mm) minimum thickness.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. [**Galvanized**] [**Stainless**]-steel, 0.064 inch (1.62 mm) thick.

6. Blade Axles: **Galvanized steel**.
7. Bearings:

a. **Oil-impregnated bronze** .
b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

1. Size: 1-inch (25-mm) diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.5 CONTROL DAMPERS

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. Greenheck Fan Corporation.
2. Arrow United Industries; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Duro Dyne Inc.
5. Flexmaster U.S.A., Inc.
6. Lloyd Industries, Inc.
7. M&I Air Systems Engineering; Division of M&I Heat Transfer Products Ltd.
8. McGill AirFlow LLC.
9. METALAIRE, Inc.
10. Metal Form Manufacturing, Inc.
11. Nailor Industries Inc.
12. NCA Manufacturing, Inc.
13. Ruskin Company.
14. Vent Products Company, Inc.
15. Young Regulator Company.

B. Low-leakage rating **with linkage outside airstream,** and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. **Galvanized** steel channels, 0.064 inch (1.62 mm) thick.
3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 8 inches (200 mm).
2. **Parallel** blade design.
3. **Galvanized** steel.
4. 0.064 inch (1.62 mm) thick.
5. Blade Edging: Closed-cell neoprene edging.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch- (13-mm-) diameter; **galvanized steel**; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 degree F (minus 40 to plus 93 deg C).

F. Bearings:

1. **Oil-impregnated bronze** .
2. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.6 FIRE DAMPERS

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. Greenheck Fan Corporation.

2. Air Balance Inc.; a division of Mestek, Inc.
3. Arrow United Industries; a division of Mestek, Inc.
4. Cesco Products; a division of Mestek, Inc.
5. McGill AirFlow LLC.
6. METALAIRE, Inc.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. PHL, Inc.
10. Pottorff; a division of PCI Industries, Inc.
11. Prefco; Perfect Air Control, Inc.
12. Ruskin Company.
13. Vent Products Company, Inc.
14. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
15. <**Insert manufacturer's name**>.

B. Type: **Static**; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to [**4-inch wg (1-kPa)** static pressure class and minimum **4000-fpm (20-m/s)** velocity.

D. Fire Rating: **1-1/2 and 3** hours.

E. Frame: **Curtain type with blades inside airstream**; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C)**] [**212 deg F (100 deg C)**] <**Insert temperature**> rated, fusible links.

K. Heat-Responsive Device: **Electric** resettable link and switch package, factory installed, [**165 deg F (74 deg C) and212 deg F (100 deg C)** rated.

2.7 CEILING DAMPERS

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. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. McGill AirFlow LLC.
4. METALAIRE, Inc.
5. Nailor Industries Inc.
6. Prefco; Perfect Air Control, Inc.
7. Ruskin Company.
8. Vent Products Company, Inc.
9. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. General Requirements:

1. Labeled according to UL 555C by an NRTL.
2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.

D. Blades: Galvanized sheet steel with refractory insulation.

E. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C)** rated, fusible links.

F. Fire Rating: [**2**] [**3**] <**Insert number**> hours.

2.8 SMOKE DAMPERS

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. Greenheck Fan Corporation.

2. Air Balance Inc.; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Nailor Industries Inc.
5. PHL, Inc.
6. Ruskin Company.

B. General Requirements: Label according to UL 555S by an NRTL.

C. Smoke Detector: Integral, factory wired for single-point connection.

D. Frame: **Curtain type with blades inside airstream** fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

E. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

F. Leakage: **Class I**.

G. Rated pressure and velocity to exceed design airflow conditions.

H. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall or floor application[**with factory-furnished silicone calking**].

I. Damper Motors: **Modulating or two-position** action.

J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in [**Division 15 Section "HVAC Instrumentation and Controls."**] [**Division 16 Sections.**]
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).

6. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).
7. Electrical Connection: **115 V, single phase, 60 Hz** .

K. Accessories:

1. Auxiliary switches for **signaling, fan control or position indication**.

2.9 COMBINATION FIRE AND SMOKE DAMPERS

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. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Ruskin Company.

B. Type: **Static and dynamic**; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to **4-inch wg (1-kPa)** static pressure class and minimum **4000-fpm (20-m/s)** velocity.

D. Fire Rating: **1-1/2 and 3** hours.

E. Frame: **Curtain type with blades inside airstream**; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

F. Heat-Responsive Device: Replaceable, [**165 deg F (74 deg C)**] [**212 deg F (100 deg C)**] rated, fusible links.

G. Heat-Responsive Device: **Electric** resettable link and switch package, factory installed, rated.

H. Smoke Detector: Integral, factory wired for single-point connection.

I. Frame: **Curtain type with blades inside airstream**; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

J. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

K. Leakage: **Class I** .

L. Rated pressure and velocity to exceed design airflow conditions.

M. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall or floor application.

N. Master control panel for use in dynamic smoke-management systems.

O. Accessories:

P. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

Q. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall or floor application.

R. Damper Motors: **Modulating or two-position** action.

S. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
3. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).
4. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).
5. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).
6. Electrical Connection: 115 V, single phase, 60 Hz.

2.10 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: **Add-on**, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.11 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."

E. Vane Construction: **Single** wall.

F. Vane Construction: Single wall for ducts up to **48 inches (1200 mm)** wide and double wall for larger dimensions.

2.12 DUCT-MOUNTED ACCESS DOORS

A. 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. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Flexmaster U.S.A., Inc.
5. Greenheck Fan Corporation.
6. McGill AirFlow LLC.
7. Nailor Industries Inc.
8. Pottorff; a division of PCI Industries, Inc.
9. Ventfabrics, Inc.
10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Vision panel.
d. Hinges and Latches: 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.
e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches **with outside and inside handles**.
d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Four hinges and two compression latches with outside and inside handles.

2.13 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip [**3-1/2 inches (89 mm)**] [**5-3/4 inches (146 mm)**] wide attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

2.14 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; [**polyethylene**] [**aluminized**] vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
4. Insulation R-value: **Comply with ASHRAE/IESNA 90.1-2004**.

C. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; **polyethylene** vapor-barrier film.

1. Pressure Rating: 4-inch wg (1000 Pa) positive and 0.5-inch wg (125 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 175 deg F (Minus 29 to plus 79 deg C).
4. Insulation R-value: **Comply with ASHRAE/IESNA 90.1-2004**.

D. Insulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil; fibrous-glass insulation; [**polyethylene**] [**aluminized**] vapor-barrier film.

1. Pressure Rating: 8-inch wg (2280 Pa) positive or negative.
2. Maximum Air Velocity: 5000 fpm (25 m/s).
3. Temperature Range: Minus 20 to plus 250 deg F (Minus 29 to plus 121 deg C).
4. Insulation R-value: **Comply with ASHRAE/IESNA 90.1-2004**.

E. Flexible Duct Connectors:

1. Clamps: **Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action** in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.

2.15 DUCT SECURITY BARS

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. Carnes.
2. KEES, Inc.
3. Lloyd Industries, Inc.
4. Metal Form Manufacturing, Inc.
5. Price Industries.

B. Description: **Field- or factory-fabricated and field-installed** duct security bars.

C. Configuration:

1. Frame: **10 gage by 2 inches (3.57 mm by 50 mm)**
2. Horizontal Bars: **1/2 inch (13 mm)**.
3. Vertical Bars: **1/2 inch (13 mm))**]

4. Bar Spacing: **6 inches (150 mm)**

2.16 DUCT 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 of length to suit duct-insulation thickness.

B. 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 in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install [**backdraft**] [**control**] dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire[**and smoke**] dampers according to UL listing.

H. Install duct security bars. Construct duct security bars from 0.164-inch (4.18-mm) steel sleeve, continuously welded at all joints and 1/2-inch- (13-mm-) diameter steel bars, 6 inches (150 mm) o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch (63-by-63-by-6-mm) steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch (300-by-300-mm) hinged access panel with cam lock in duct in each side of sleeve.

I. Connect ducts to duct silencers **with flexible duct connectorsrigidly**.

J. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream [**and downstream** from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. Control devices requiring inspection.
8. Elsewhere as indicated.

K. Install access doors with swing against duct static pressure.

L. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
5. Body Access: 25 by 14 inches (635 by 355 mm).
6. Body plus Ladder Access: 25 by 17 inches (635 by 430 mm).

M. Label access doors according to Division 15 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

N. Install flexible connectors to connect ducts to equipment.

O. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

P. Connect terminal units to supply ducts with maximum **12-inch (300-mm)** lengths of flexible duct. Do not use flexible ducts to change directions.

Q.

R. Connect flexible ducts to metal ducts with **liquid adhesive plus tape and draw bands** or **adhesive plus sheet metal screws**].

S. Install duct test holes where required for testing and balancing purposes.

T. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF 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 TAB to produce design objectives for the following:

1. Constant-volume air systems.
2. HVAC equipment quantitative-performance settings.
3. Verifying that automatic control devices are functioning properly.
4. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.

C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

D. NC: Noise criteria.

E. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

F. RC: Room criteria.

G. Report Forms: Test data sheets for recording test data in logical order.

H. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

I. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

J. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

K. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

L. TAB: Testing, adjusting, and balancing.

M. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

N. Test: A procedure to determine quantitative performance of systems or equipment.

O. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 SUBMITTALS

A. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

B. Sample Report Forms: Submit two sets of sample TAB report forms.

C. Warranties specified in this Section.

1.5 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.6 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:

B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:

1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."

D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.

G. Examine system and equipment test reports.

H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

K. Examine strainers for clean screens and proper perforations.

L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine equipment for installation and for properly operating safety interlocks and controls.

P. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices are operated by the intended controller.
2. Dampers and valves are in the position indicated by the controller.
3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at indicated values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.

Q. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure fan static pressures to determine actual static pressure as follows:

    a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
    b. Measure static pressure directly at the fan outlet or through the flexible connection.
    c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
    d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

    a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.

    a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure terminal outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.5 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer, model, and serial numbers.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

3.6 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.7 PROCEDURES FOR HEAT-TRANSFER COILS

A. Refrigerant Coils: Measure the following data for each coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.

3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

3.8 PROCEDURES FOR TEMPERATURE MEASUREMENTS

A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.9 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Check the operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Check free travel and proper operation of control devices such as damper and valve operators.

F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.

G. Check the interaction of electrically operated switch transducers.

H. Check the interaction of interlock and lockout systems.

I. Check main control supply-air pressure and observe compressor and dryer operations.

J. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or non grounded power supply.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.10 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.
2. Air Outlets and Inlets: 0 to minus 10 percent.

3.11 FINAL REPORT

A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

   1. Include a list of instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to certified field report data, include the following:

   1. Pump curves.
   2. Fan curves.
   3. Manufacturers' test data.
   4. Field test reports prepared by system and equipment installers.
   5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.

D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:

   1. Title page.
   2. Name and address of TAB firm.
   3. Project name.
   4. Project location.
   5. Engineer's name and address.
   6. Contractor's name and address.
   7. Report date.
   8. Signature of TAB firm who certifies the report.
   9. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
   10. Summary of contents including the following:

      a. Indicated versus final performance.
      b. Notable characteristics of systems.
      c. Description of system operation sequence if it varies from the Contract Documents.

   11. Nomenclature sheets for each item of equipment.
   12. Data for terminal units, including manufacturer, type size, and fittings.
   13. Notes to explain why certain final data in the body of reports varies from indicated values.
   14. Test conditions for fans and pump performance forms including the following:

      a. Settings for outside-, return-, and exhaust-air dampers.
      b. Conditions of filters.
      c. Cooling coil, wet- and dry-bulb conditions.
      d. Face and bypass damper settings at coils.
      e. Fan drive settings including settings and percentage of maximum pitch diameter.
      f. Inlet vane settings for variable-air-volume systems.
      g. Settings for supply-air, static-pressure controller.
      h. Other system operating conditions that affect performance.

E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outside, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:

   a. Unit identification.
   b. Location.
   c. Make and type.
   d. Model number and unit size.
   e. Manufacturer's serial number.
   f. Unit arrangement and class.
   g. Discharge arrangement.
   h. Sheave make, size in inches (mm), and bore.
   i. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
   j. Number of belts, make, and size.
   k. Number of filters, type, and size.

2. Motor Data:

   a. Make and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches (mm), and bore.
   f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).

3. Test Data (Indicated and Actual Values):

   a. Total airflow rate in cfm (L/s).
   b. Total system static pressure in inches wg (Pa).
   c. Fan rpm.
   d. Discharge static pressure in inches wg (Pa).
   e. Filter static-pressure differential in inches wg (Pa).
   f. Preheat coil static-pressure differential in inches wg (Pa).
   g. Cooling coil static-pressure differential in inches wg (Pa).
   h. Heating coil static-pressure differential in inches wg (Pa).
   i. Outside airflow in cfm (L/s).
   j. Return airflow in cfm (L/s).
   k. Outside-air damper position.
   l. Return-air damper position.
   m. Vortex damper position.

G. Apparatus-Coil Test Reports:

1. Coil Data:

    a. System identification.
    b. Location.
    c. Coil type.
    d. Number of rows.
    e. Fin spacing in fins per inch (mm) o.c.
    f. Make and model number.
    g. Face area in sq. ft. (sq. m).
    h. Tube size in NPS (DN).
    i. Tube and fin materials.
    j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

    a. Airflow rate in cfm (L/s).
    b. Average face velocity in fpm (m/s).
    c. Air pressure drop in inches wg (Pa).
    d. Outside-air, wet- and dry-bulb temperatures in deg F (deg C).
    e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
    f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
    g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
    h. Refrigerant expansion valve and refrigerant types.
    i. Refrigerant suction pressure in psig (kPa).
    j. Refrigerant suction temperature in deg F (deg C).

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and size.
    e. Manufacturer's serial number.
    f. Arrangement and class.
    g. Sheave make, size in inches (mm), and bore.
    h. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).

2. Motor Data:

    a. Make and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches (mm), and bore.
    f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
    g. Number of belts, make, and size.

3. Test Data (Indicated and Actual Values):

    a. Total airflow rate in cfm (L/s).
    b. Total system static pressure in inches wg (Pa).

c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Suction static pressure in inches wg (Pa).

I. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, or water-cooled condensing units, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Unit make and model number.
d. Compressor make.
e. Compressor model and serial numbers.
f. Refrigerant weight in lb (kg).
g. Low ambient temperature cutoff in deg F (deg C).

2. Test Data (Indicated and Actual Values):

a. Inlet-duct static pressure in inches wg (Pa).
b. Outlet-duct static pressure in inches wg (Pa).
c. Entering-air, dry-bulb temperature in deg F (deg C).
d. Leaving-air, dry-bulb temperature in deg F (deg C).
e. Control settings.
f. Unloader set points.
g. Low-pressure-cutout set point in psig (kPa).
h. High-pressure-cutout set point in psig (kPa).
i. Suction pressure in psig (kPa).
j. Suction temperature in deg F (deg C).
k. Condenser refrigerant pressure in psig (kPa).
l. Condenser refrigerant temperature in deg F (deg C).
m. Oil pressure in psig (kPa).
n. Oil temperature in deg F (deg C).
o. Voltage at each connection.
p. Amperage for each phase.
q. Kilowatt input.
r. Crankcase heater kilowatt.
s. Number of fans.
t. Condenser fan rpm.
u. Condenser fan airflow rate in cfm (L/s).
v. Condenser fan motor make, frame size, rpm, and horsepower.
w. Condenser fan motor voltage at each connection.
x. Condenser fan motor amperage for each phase.

J. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.

e. Dates of calibration.

3.12 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:

   a. Measure airflow of at least 10 percent of air outlets.
   b. Measure water flow of at least 5 percent of terminals.
   c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
   d. Measure sound levels at two locations.
   e. Measure space pressure of at least 10 percent of locations.
   f. Verify that balancing devices are marked with final balance position.
   g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Engineer.
3. Engineer shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 15950

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. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wire ways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

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 Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 7 Section "Through-Penetration Firestop Systems."

2.3 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. **Available** Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.

d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: **EPDM** interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: **Carbon steel**. Include two for each sealing element.
4. Connecting Bolts and Nuts: **Carbon steel with corrosion-resistant coating** of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wire ways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 7 Section "Through-Penetration Firestop Systems."

C. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

D. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

E. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

F. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

G. Cut sleeves to length for mounting flush with both surfaces of walls.

H. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

I. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed **or unless seismic criteria require a different clearance**].

J. Seal space outside of sleeves with grout for penetrations of concrete and masonry **and with approved joint compound for gypsum board assemblies**.

K. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

L. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."

M. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

N. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

O. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply fire stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Fire stopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.5 FIELD QUALITY CONTROL

A. Inspect installed sleeve and sleeve-seal installations and associated fire stopping for damage and faulty work.

END OF SECTION 16050

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 methods and materials for grounding systems and equipment**, plus the following special applications:**
   1. Common ground bonding with lightning protection system.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:

   1. Grounding arrangements and connections for separately derived systems.
   2. Grounding for sensitive electronic equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: **Copper** wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
   7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Bare Grounding Conductor and Conductor Protector for Wood Poles:

1. No. 4 AWG minimum, soft-drawn copper.
2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.

D. Grounding Bus: Rectangular bars of annealed copper, **1/4 by 2 inches (6 by 50 mm)** in cross section, unless otherwise indicated; with insulators.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. **8** AWG and smaller, and stranded conductors for No. **6** AWG and larger, unless otherwise indicated.
1. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.

3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

G. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install **tinned** bonding jumper to bond across flexible duct connections to achieve continuity.

F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: **10** ohms.
2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: **5** ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

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. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IBC: International Building Code.

C. IMC: Intermediate metal conduit.

D. NBC: National Building Code.

E. OSHPD: Office of Statewide Health Planning and Development.

F. RMC: Rigid metal conduit.

G. SBC: Standard Building Code.

H. Qualification Data: For **professional engineer and testing agency**.

I. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the **IBC** unless requirements in this Section are more stringent.

B. "Structural Welding Code - Steel." Not permitted

C. Assigned Seismic Use Group or Building Category as Defined in the IBC: **II**.

1.5 PROJECT CONDITIONS

A. Project Seismic Zone as Defined in the UBC: Zone **1**

B. Project Seismic Zone Factor as Defined in the UBC: Zone Factor [**0.075**] [**0.15**] [**0.20**] [**0.30**] [**0.40**].

C. Occupancy Category as Defined in the UBC: **II**.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of **five** times the applied force.

B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly.

1. **Available** Manufacturers:

a. Cooper B-Line; a division of Cooper Industries.
b. ERICO International Corporation.
c. Allied Support Systems; Power-Strut Unit.
d. GS Metals Corp.
e. Michigan Hanger Co., Inc.; O-Strut Div.
f. National Pipe Hanger Corp.
g. Thomas & Betts Corporation.
h. Unistrut; Tyco International, Ltd.
i. Wesanco, Inc.

2. Finishes:

a. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3.
b. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-3.
c. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-3.

C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least 1 surface.

1. **Available** Manufacturers:

a. Allied Support Systems; Aickinstrut Unit.
b. Cooper B-Line; a division of Cooper Industries.
c. Fabco Plastics Wholesale Limited.
d. Seasafe, Inc.

2. Or equal Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.

3. Fitting and Accessory Materials: Same as channels and angles**, except metal items may be stainless steel**.

D. Raceway and Cable Supports: As described in NECA 1.

E. Conduit and Cable Support Devices: **Steel and malleable-iron** hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

F. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

G. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

H. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

   a. **Available** Manufacturers:

      1) Hilti, Inc.
      2) ITW Construction Products.
      3) MKT Fastening, LLC.
      4) Simpson Strong-Tie Co. Inc.
      5) Or equal

2. Mechanical-Expansion Anchors: Insert-wedge-type, **zinc-coated** steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   a. **Available** Manufacturers:

      1) Cooper B-Line; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc
      3) Hilti, Inc.
      4) ITW Construction Products.
      5) MKT Fastening, LLC.
      6) Powers Fasteners.

3. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 5 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as **scheduled in NECA 1, where Table 1 lists maximum spacings less than stated in**] NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [**or other**]support system, sized so capacity can be increased by at least [**25**] <**Insert number**> percent in future without exceeding specified design load limits.

1. Secure raceways and cables to trapeze member with clamps approved for application by [**an evaluation service member of the ICC Evaluation Program** or **an agency acceptable to authorities having jurisdiction**]
2. Secure raceways and cables to these supports with **two-bolt conduit clamps**

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 for installation requirements, except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, **EMT, IMC, and RMC** may be supported by openings through structure members, as permitted in NFPA 70.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm)

thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.

6. To Light Steel: Sheet metal screws.

D.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 5 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Not permitted

END OF SECTION 16072

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. Identification for raceway and metal-clad cable.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Color for Printed Legend:

1. Power Circuits: Black letters on an orange field.
2. <**Insert systems and assigned colors.**>
3. Legend: Indicate system or service and voltage, if applicable.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.

D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking nylon tie fastener.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
3. <**Insert names and wording of additional warning signs or labels.**>

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with [**black letters on white face**] <**Insert colors**>.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength: 50 lb (22.6 kg), minimum.
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements are specified in Division 9 painting Sections.

1. Exterior Concrete Unit Masonry:

a. Semigloss Acrylic-Enamel Finish: **Two**finish coat(s) over a block filler.

1) Block Filler: Concrete unit masonry block filler.
2) Finish Coats: Exterior semigloss acrylic enamel.

2. Exterior Ferrous Metal:

a. Semigloss Alkyd-Enamel Finish: **Two**finish coat(s) over a primer.

1) Primer: Exterior ferrous-metal primer.
2) Finish Coats: Exterior semigloss alkyd enamel.

3. Interior Concrete Unit Masonry:

a. Semigloss Acrylic-Enamel Finish: **One** finish coat(s) over a block filler.

1) Block Filler: Concrete unit masonry block filler.
2) Finish Coats: Interior semigloss acrylic enamel.

4. Interior Ferrous Metal:

a. Semigloss Acrylic-Enamel Finish: **One** finish coat(s) over a primer.

1) Primer: Interior ferrous-metal primer.
2) Finish Coats: Interior semigloss acrylic enamel.

C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Raceways and Duct Banks More Than 600 V Concealed within Buildings: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED

HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways and Metal-Clad Cables More Than 600 V: Identify with "DANGER-HIGH VOLTAGE" in black letters at least 2 inches (50 mm) high, with **snap-around labels**

C.

D. . Repeat legend at 10-foot (3-m) maximum intervals.

E. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than **30 A** : Identify with orange **snap-around label**.

F. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, **snap-around, color-coding bands**:

1. Fire Alarm System: Red.
2. Fire-Suppression Supervisory and Control System: Red and yellow.
3. Combined Fire Alarm and Security System: Red and blue.
4. Security System: Blue and yellow.
5. Mechanical and Electrical Supervisory System: Green and blue.
6. Telecommunication System: Green and yellow.
7. Control Wiring: Green and red.

G. Power-Circuit Conductor Identification: For **primary and secondary** conductors No. **1/0** AWG and larger in vaults, pull and junction boxes, manholes, and handholes use **aluminum wraparound marker labels**. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

H. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use **color-coding conductor tape**. Identify each ungrounded conductor according to source and circuit number.

I. Conductors to Be Extended in the Future: Attach **write-on tags** to conductors and list source and circuit number.

J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply **baked-enamel warning signs** . Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

   a. Power transfer switches.
   b. Controls with external control power connections.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

L. Instruction Signs:

1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for **power transfer load shedding** .

M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

   a. Indoor Equipment: **Engraved, laminated acrylic or melamine label**. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches
   b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

   a. Panelboards, electrical cabinets, and enclosures.
   b. Access doors and panels for concealed electrical items.
   c. Electrical switchgear and switchboards.
   d. Transformers.
   e. Emergency system boxes and enclosures.
   f. Disconnect switches.
   g. Motor starters.
   h. Push-button stations.
   i. Contactors.
   j. Remote-controlled switches, dimmer modules, and control devices.
   k. Voice and data cable terminal equipment.

l. Fire-alarm control panel and annunciators.
m. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.
n. Monitoring and control equipment.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach non adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Color-Coding for Phase[**and Voltage Level**] Identification, 600 V and Less: Use the colors listed below for ungrounded [**service**] [**feeder**] [**branch-circuit**] [**service, feeder, and branch-circuit**] conductors.

1. Color shall be [**factory applied**] [**factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied**].
2. Colors for 208/120-V Circuits:

   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench **or concrete envelope** exceeds 16 inches (400 mm) overall.

J. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.

END OF SECTION 16075

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. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.

B. Related Sections include the following:

1. Division 16 Section "Voice and Data Communication Cabling" for cabling used for voice and data circuits.
2.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For testing agency.

C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

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. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

C. **Copper** Conductors: Comply with NEMA WC 70.

D. Conductor Insulation: Comply with NEMA WC 70 for Types **THHN-THWN**, **XHHW and SO**.

E. Multi-conductor Cable: Comply with NEMA WC 70 for **armored cable, Type AC metal-clad cable, Type SO** with ground wire.

2.2 CONNECTORS AND SPLICES

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. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 7 Section "Through-Penetration Firestop Systems."

2.4 SLEEVE SEALS

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:

C. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.
4. Pipeline Seal and Insulator, Inc.

D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.

1. Sealing Elements: **EPDM** interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: **Carbon steel** Include two for each sealing element.
3. Connecting Bolts and Nuts: **Carbon steel with corrosion-resistant coating** of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: **Copper**. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: **Type THHN-THWN, conductors in raceway**.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: **Type THHN-THWN, single conductors in raceway**

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: **Type THHN-THWN, single conductors in raceway**.

D. Exposed Branch Circuits: **Type THHN-THWN, single conductors in raceway.**

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: **Type THHN-THWN, single conductors in raceway**.

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: **Type THHN-THWN, single conductors in raceway**.

G. Class 1 Control Circuits: Type THHN-THWN, in raceway.

H. Class 2 Control Circuits: **Type THHN-THWN, in raceway**, **Power-limited cable, concealed in building finishes**.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 16 Section "Electrical Supports and Seismic Restraints."

F. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

   1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches (150 mm)** of slack.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 7 Section "Through-Penetration Firestop Systems."

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Rectangular Sleeve Minimum Metal Thickness:

   1. For sleeve rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
   2. For sleeve rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

F. Cut sleeves to length for mounting flush with both wall surfaces.

G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed **unless seismic criteria require different clearance**.

I. Seal space outside of sleeves with grout for penetrations of concrete and masonry **and with approved joint compound for gypsum board assemblies**.

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 7 Section "Joint Sealants."

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 7 Section "Through-Penetration Firestop Systems."

L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

M. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

N. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

A. Install to seal underground exterior-wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRE STOPPING

A. Apply fire stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 7 Section "Through-Penetration Firestop Systems."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test **all normal and emergency feeder conductors** for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

   a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
   b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 16120

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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:

1. Division 2 Section "Underground Ducts and Utility Structures" for exterior duct banks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FMC: Flexible metal conduit.

E. IMC: Intermediate metal conduit.

F. LFMC: Liquid tight flexible metal conduit.

G. LFNC: Liquid tight flexible nonmetallic conduit.

H. NBR: Acrylonitrile-butadiene rubber.

I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wire ways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.

2. For hand holes and boxes for underground wiring, including the following:

   a. Duct entry provisions, including locations and duct sizes.
   b. Frame and cover design.
   c. Grounding details.
   d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
   e. Joint details.

C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

   1. Structural members in the paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

D. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 16 Section "Electrical Supports and Seismic Restraints." Include the following:

   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

      a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified **and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event**."

   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Qualification Data: For professional engineer and testing agency.

F. Source quality-control test reports.

1.5 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

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. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Electri-Flex Co.
6. Manhattan/CDT/Cole-Flex.
7. Maverick Tube Corporation.
8. O-Z Gedney; a unit of General Signal.
9. Wheatland Tube Company.
10. <**Insert manufacturer's name.**>

C. Rigid Steel Conduit: ANSI C80.1.

D. IMC: ANSI C80.6.

E. EMT: ANSI C80.3.

F. FMC: [**Zinc-coated steel**][**or aluminum**].

G. LFMC: Flexible steel conduit with PVC jacket.

H. Fittings for Conduit (Including all Types and Flexible and Liquid tight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: **Steel**, **set-screw** type.
3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

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. Arnco Corporation.
2. Endot Industries Inc.
3. IPEX Inc.
4. Lamson & Sessions; Carlon Electrical Products.

C. Description: Comply with UL 2024; flexible type, approved for [**plenum**] [**riser**] [**general-use**] installation.

2.3 METAL WIREWAYS

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. Cooper B-Line, Inc.
2. Hoffman.
3. Square D; Schneider Electric.
4. Wiremold

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type [**1**] [**12**] [**3R**], unless otherwise indicated.

D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wire ways as required for complete system.

E. Wireway Covers: **As indicated**.

F. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

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. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

C. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.

D. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

E. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wire ways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. [**Manufacturer's standard enamel finish in color selected by Architect**] [**Prime coating, ready for field painting**].

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. Thomas & Betts Corporation.
   b. Walker Systems, Inc.; Wiremold Company (The).
   c. Wiremold Company (The); Electrical Sales Division.
   d. <**Insert manufacturer's name.**>

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from [**manufacturer's standard**] [**custom**] colors.

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. Butler Manufacturing Company; Walker Division.
   b. Enduro Systems, Inc.; Composite Products Division.
   c. Hubbell Incorporated; Wiring Device-Kellems Division.
   d. Lamson & Sessions; Carlon Electrical Products.
   e. Panduit Corp.
   f. Walker Systems, Inc.; Wiremold Company (The).
   g. Wiremold Company (The); Electrical Sales Division.
   h. <**Insert manufacturer's name.**>

2.6 BOXES, ENCLOSURES, AND CABINETS

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. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.

6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet Division.
10. Spring City Electrical Manufacturing Company.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

C. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

D. Cast-Metal Outlet and Device Boxes: NEMA FB 1, **ferrous alloy**, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

F. Metal Floor Boxes: **Cast metal fully adjustable**, rectangular.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, [**cast aluminum**] [**galvanized, cast iron**] with gasketed cover.

I. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic[**, finished inside with radio-frequency-resistant paint**].

J. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

2.7 SLEEVES FOR RACEWAYS

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of fire stopping specified in Division 7 Section "Through-Penetration Firestop Systems."

2.8 SLEEVE SEALS

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:

C. Basis-of-Design Product: Subject to compliance with requirements, provide [**the product indicated on Drawings**] <**Insert manufacturer's name; product name or designation**> or a comparable product by one of the following:

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.
4. Pipeline Seal and Insulator, Inc.
5. <**Insert manufacturer's name.**>

D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.

1. Sealing Elements: **EPDM**> interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: **Carbon steel**. Include two for each sealing element.
3. Connecting Bolts and Nuts: [**Carbon steel with corrosion-resistant coating**] [**Stainless steel**] of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: **Rigid steel conduit**.
2. Concealed Conduit, Aboveground: **EMT**.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): **LFMC**.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type [**3R**] [**4**].
   a.

B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: **EMT**.
2. Exposed, Not Subject to Severe Physical Damage: **Rigid steel conduit** RMC.
3. Exposed and Subject to Severe Physical Damage: **Rigid steel conduit**. Includes raceways in the following locations:
   a. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   b. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: **EMT**

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: **Rigid steel conduit**.
7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: **Plenum-type, optical fiber/communications cable raceway EMT raceway type**.
8. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable:
9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, **stainless steel** in damp or wet locations.

C. Minimum Raceway Size: [**1/2-inch (16-mm)**] [**3/4-inch (21-mm)**] trade size.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 16 Section "Electrical Supports and Seismic Restraints."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).

1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
   a. Indoor Spaces: Connected with the Outdoors without Physical Separation: [**125 deg F (70 deg C)**] temperature change.
   b. Attics: **135 deg F (75 deg C)** temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

O. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for **recessed lighting fixtures,** equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

P. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

Q. Set metal floor boxes level and flush with finished floor surface.

R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 ``SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Through-Penetration Firestop Systems."

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

F. Cut sleeves to length for mounting flush with both surfaces of walls.

G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway unless sleeve seal is to be installed[**or unless seismic criteria require different clearance**].

I. Seal space outside of sleeves with grout for penetrations of concrete and masonry[**and with approved joint compound for gypsum board assemblies**].

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."

L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.

M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.4 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.5 FIRE STOPPING

A. Apply fire stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Fire stopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."

3.6 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 16130

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. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Receptacles with integral surge suppression units.
4. Wall-box motion sensors.
5. Isolated-ground receptacles.
6. Snap switches and wall-box dimmers.
7. Solid-state fan speed controls.
8. Wall-switch and exterior occupancy sensors.
9. Communications outlets.
10. Pendant cord-connector devices.
11. Cord and plug sets.
12. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

B. Related Sections include the following:

1. Division 16 Section "Voice and Data Communication Cabling" for workstation outlets.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
5. General Electric

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Cooper; 5351 (single), 5352 (duplex).
   b. Hubbell; HBL5351 (single), CR5352 (duplex).
   c. Leviton; 5891 (single), 5352 (duplex).
   d. Pass & Seymour; 5381 (single), 5352 (duplex).
   e. General Electric

B. Hospital-Grade, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498 Supplement SD.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Cooper; 8300 (duplex).
   b. Hubbell; HBL8310 (single), HBL8300H (duplex).
   c. Leviton; 8310 (single), 8300 (duplex).
   d. Pass & Seymour; 9301-HG (single), 9300-HG (duplex).

C. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Hubbell; CR 5253IG.
   b. Leviton; 5362-IG.
   c. Pass & Seymour; IG6300.

3. General Electric Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

D. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. Cooper; TR8300.
   b. Hubbell; HBL8300SG.
   c. Leviton; 8300-SGG.
   d. Pass & Seymour; 63H.

3. General Electric Description: Labeled to comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, [**feed**] [**non-feed**]-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; GF20.
    b. Pass & Seymour; 2084.
    c. Leviton

C. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with UL 498 Supplement SD.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; HGF20.
    b. Hubbell; HGF8300.
    c. Leviton; 6898-HG.
    d. Pass & Seymour; 2091-SHG.

D. Hospital-Grade, Duplex Convenience Receptacles: Comply with UL 498 Supplement SD.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; 8300BLS.
    b. Hubbell; HBL8362SA.
    c. Leviton; 8380.

3. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.

2.4 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; L520R.
    b. Hubbell; HBL2310.
    c. Leviton; 2310.

d. Pass & Seymour; L520-R.

B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; IG2310.
b. Leviton; 2310-IG.

3. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.5 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

C. Pilot Light Switches, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 2221PL for 120 V and 277 V.
b. Hubbell; HPL1221PL for 120 V and 277 V.
c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
d. Pass & Seymour; PS20AC1-PLR for 120 V.
e. <**Insert manufacturer's name; catalog numbers.**>

3. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."

D. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; 1995.
    b. Hubbell; HBL1557.
    c. Leviton; 1257.
    d. Pass & Seymour; 1251.

2.6 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters suitable for LED lighting.

B. Control: Continuously adjustable **slider**; with single-pole or three-way switching. Comply with UL 1472.

1. 600 W; dimmers shall require no derating when ganged with other devices. [**Illuminated when "OFF."**]

2.7 FAN SPEED CONTROLS

A. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.

1. Continuously adjustable **slider5 A**.

2.8 OCCUPANCY SENSORS

A. Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

    a. Cooper; 6111 for 120 V, 6117 for 277 V.
    b. Hubbell; WS1277.
    c. Leviton; ODS 10-ID.
    d. Pass & Seymour; WS3000.
    e. Watt Stopper (The); WS-200.

3. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).

B. Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; AT120 for 120 V, AT277 for 277 V.
b. Leviton; ODS 15-ID.
c. General Electric

3. Description: Adaptive-technology type, 120/277 V, adjustable time delay up to 20 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).

C. Wide-Range Wall-Switch Sensors:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Hubbell; ATP120HBRP.
b. Leviton; ODWHB-IRW.
c. Pass & Seymour; HS1001.
d. Watt Stopper (The); CX-100-3.

3. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 150-degree field of view, with a minimum coverage area of 1200 sq. ft. (111 sq. m).

2.9 COMMUNICATIONS OUTLETS

A. Telephone Outlet:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 3560-6.
b. Leviton; 40649.
c. Specific to the owners requirement

3. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.

B. Combination TV and Telephone Outlet:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 3562.
b. Leviton; 40595.

3. Specific to the owners requirement Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e; and one Type F coaxial cable connector.

2.10 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: **satin-finished stainless steel 0.04-inch- (1-mm-) thick**.
3. Material for Unfinished Spaces: **Galvanized steel** Material for Damp Locations: **Cast aluminum** with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.11 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: **Almond** , unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: **Red** .
3. TVSS Devices: Blue.
4. Isolated-Ground Receptacles: **Orange**.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.

c. Pig tailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles **up**, and on horizontally mounted receptacles to the **left**.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi gang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Electrical Identification."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with **white** filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Test straight blade [**convenience outlets in patient-care areas**] [**hospital-grade convenience outlets**] for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

END OF SECTION 16140

PART 1. GENERAL

1.01. 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.

1.02. SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Non fusible switches.
3. Molded-case circuit breakers.
4. Enclosures.

1.03. DEFINITIONS

A. GD: General duty.

B. GFCI: Ground-fault circuit interrupter.

C. HD: Heavy duty.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

1.04. REFERENCES

A. NFPA 70: National Electrical Code.

B. NEMA ks1: Enclosed switches.

1.05. SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.

2. Current and voltage ratings.

3. Short-circuit current rating.

4. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

2. Time-current curves, including selectable ranges for each type of circuit breaker.

1.06. QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.07. PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

2. Altitude: Not exceeding 6600 feet (2010 m).

1.08. COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.09. EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spares: For the following:

a. Fuses for Fusible Switches: One set for each switch supplied.

PART 2. PRODUCTS

2.01. MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02. FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.

2. General Electric Co.; Electrical Distribution & Control Division.

3. Square D/Group Schneider.

B. Fusible Switch, 600 A and Smaller: Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Non fusible Switch, 600 A and Smaller: Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.

3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.03. MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:

1. Eaton Corporation; Cutler-Hammer Products.

2. General Electric Co.; Electrical Distribution & Control Division.

3. Square D/Group Schneider.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

3. Electronic Trip-Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

   a. Instantaneous trip.

   b. Long- and short-time pickup levels.

   c. Long- and short-time time adjustments.

   d. Ground-fault pickup level, time delay, and I^2t response.

C. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.

2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.

3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator where indicated.

5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at indicated percent of rated voltage.

2.04. ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.

2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

3. Finishes: Manufacturers standard prime coat finish.. ANSI 61 grey.

PART 3. EXECUTION

3.01. EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. INSTALLATION

A. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

B. Circuit breakers provided for existing panelbards shall be made by the existing panelboard manufacturer and shall be the same model, type, style and rated for the same interrupting current as the existing circuit breakers in the existing panelboard.

3.03. IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

B. Enclosure Nameplates: Label each enclosure as specified in Division 16 Section "Electrical Identification."

C. Update existing panelboard schedule with a new typed panelboard schedule. Marking up the existing panelboard schedule will not be acceptable.

3.04. FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.

2. Verify switch and labeling verification.

3. Verify rating of installed fuses.

4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Infrared Scanning:

3.05. ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.06. CLEANING

A. On completion of installation, vacuum dirt and debris from interiors, remove paint splatter and other spots, do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END SECTION 16410

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. Interior LED lighting fixtures.
2. Emergency LED lighting fixtures.
3. Exit signs.
4. Lighting fixture supports.
5. Retrofit kits for fluorescent lighting fixtures.

B. Related Sections include the following:
1. Division 16 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.
2. Division 16 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
3. Division 16 Section "Dimming Controls" for architectural dimming systems.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CRI: Color-rendering index.

C. CU: Coefficient of utilization.

D. HID: High-intensity discharge.

E. LER: Luminaire efficacy rating.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

G. RCR: Room cavity ratio.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. LED drivers.
4. Energy-efficiency data.
5. Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data required in "Submittals" Article in Division 15 Section "Diffusers, Registers, and Grilles."
6. Sound Performance Data: For air-handling lighting fixtures. Indicate sound power level and sound transmission class in test reports certified according to standards specified in Division 15 Section "Diffusers, Registers, and Grilles."
7. Life, output, and energy-efficiency data for lamps.
8. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.

1. Wiring Diagrams: Power **and control** wiring if any.

C. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Lighting fixtures.
2. Suspended ceiling components.
3. Structural members to which suspension systems for lighting fixtures will be attached.
4. Other items in finished ceiling including the following:

a. Air outlets and inlets.
b. Speakers.
c. Sprinklers.
d. Smoke and fire detectors.
e. Occupancy sensors.
f. Access panels.

5. Perimeter moldings.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.
1.

1.6 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: **10** years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

2. Warranty Period for LED light fixture: **Ten (10)** years from date of Substantial Completion.

1.8 EXTRA MATERIALS

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In Interior Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each lighting fixture is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: LED vandal resistant type fixtures Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Metal Parts: Free of burrs and sharp corners and edges.

C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

D. Doors, Frames, and Other Internal Access: Vandal resistant accessible only with special tools.

E. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

F. Plastic Diffusers, Covers, and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least [**0.14 inch (3.6 mm)**] minimum unless different thickness is indicated.
b. UV stabilized.

G. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic-interference as required by MIL-STD-461E. Fabricate lighting fixtures with drivers to minimize magnetic interference.

2.3 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted exit Signs:
1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.

2.4 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Division 16 Section "Electrical Supports and Seismic Restraints" for channel- and angle-iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Comply manufacturer's instruction for vandal resistant fixtures

B. Support for Lighting Fixtures independent of Grid-Type Suspended Ceilings: Do not use grid as a support element.

C. Support lighting fixtures in sheet rock ceiling independent of the sheet rock ceiling. Do not use the ceiling as the main support for the recessed light fixture.

D. In isolation rooms coordinate the support of the light fixtures with the special construction for the ceiling in that area. Coordinate with the architectural detail for the ceiling in the isolation room.

E. Connect wiring according to Division 16 Section "Conductors and Cables."

F. Comply with the International Electric Code for separation of voltage systems originating from separate sources, for lighting fixtures being served with normal and emergency power.

3.2 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16511

LOU WALKER SENIOR CENTER
CLASSROOM RENOVATIONS
ITB No.

2538 PANOLA ROAD
LITHONIA, GA 30058

DeKalb County
GEORGIA

BY

BROWN DESIGN GROUP, INC.
ARCHITECTS * ENGINEERS * PLANNERS
3099 WASHINGTON ROAD * ATLANTA, GEORGIA 30344
(404)559-1805 * FAX (404)761-0020
www.thebrowndesigngroup.com

LIST OF DRAWINGS:

TS1 TITLE SHEET

ARCHITECTURAL
A0.0 GENERAL INFORMATION
A0.1 DEMOLITON FLOOR PLAN
A0.2 DEMOLITION REFLECTED CEILING PLAN
A1.1 NEW WORK FLOOR PLAN
A1.2 NEW WORK FINISH PLAN
A1.3 NEW WORK REFLECTED CEILING PLAN
A2.0 DOORS, SCHEDULE & DETAILS

MECHANICAL
M0.1 MECHANICAL HVAC LEGEND SCHEDULE, DETAILS AND NOTES
M1.1 MECHANICAL HVAC DEMOLITION PLAN
M1.2 MECHANICAL HVAC PLAN AND NOTES
M1.2 MECHANICAL HVAC PIPING & OUTSIDE AIR DUCT PLAN & NOTES

ELECTRICAL
E0.1 ELECTRICAL LEGEND SCHEDULE, DETAILS AND NOTES
E1.1 ELECTRICAL DEMOLITION PLAN AND NOTES
E1.2 ELECTRICAL POWER PLAN AND NOTES
E1.3 ELECTRICAL LIGHTING PLAN AND NOTES

PROJECT SCOPE:

INTERIOR RENOVATION:

REPLACEMENT/RECONFIGURATION OF EXISTING CLASSROOMS PARTITIONS, FLOOR AND WALL FINISHES, CEILING GRID, LIGHTING AND MECHANICAL SYSTEMS TO SUPPORT NEW LAYOUT. EXISTINGS POINTS OF ACCESS AND EGRESS SHALL REMAIN UNALTERED.

PROJECT INFO:

OWNER: DEKALB COUNTY GOVERNMENT
1300 COMMERCE DRIVE
DECATUR, GA 30030
CONTACT: DULCE GUZMAN
(404) 687 - 3552

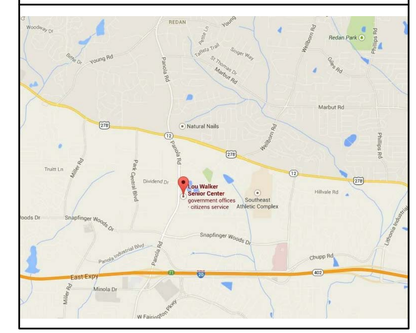
ARCHITECT: BROWN DESIGN GROUP, INC.
3099 WASHINGTON ROAD
EAST POINT, GA 30344
CONTACT: COY L. COOPER, JR. RA
(404) 559 - 1805

BUILDING	**2012 IBC (W/ GA AMENDMENTS)**
STRUCTURAL	**2012 IBC (W/ GA AMENDMENTS)**
MECHANICAL	**2012 IMC (W/ GA AMENDMENTS)**
ELECTRICAL	**2014 NEC**
PLUMBING	**2012 IPC (W/ GA AMENDMENTS)**
ACCESSIBILITY	**2010 ADAAG W/ 1997 GA ACCESSIBILTY CODE**
FIRE	**2012 IFC (W/ GA AMENDMENTS)**
LIFE SAFETY	**2012 NFPA 101 LIFE SAFETY CODE**
ENERGY	**2009 IECC (W/ GA SUPPLEMENTS & AMENDMENTS)**
GAS	**2012 IFGC (W/ GA AMENDMENTS)**

CONSTRUCTION TYPE: TYPE 2
OCCUPANCY: GROUP B

DATA TABLE
SQ. FT.
Area of Work: 4,100 SF (APPROXIMATELY)

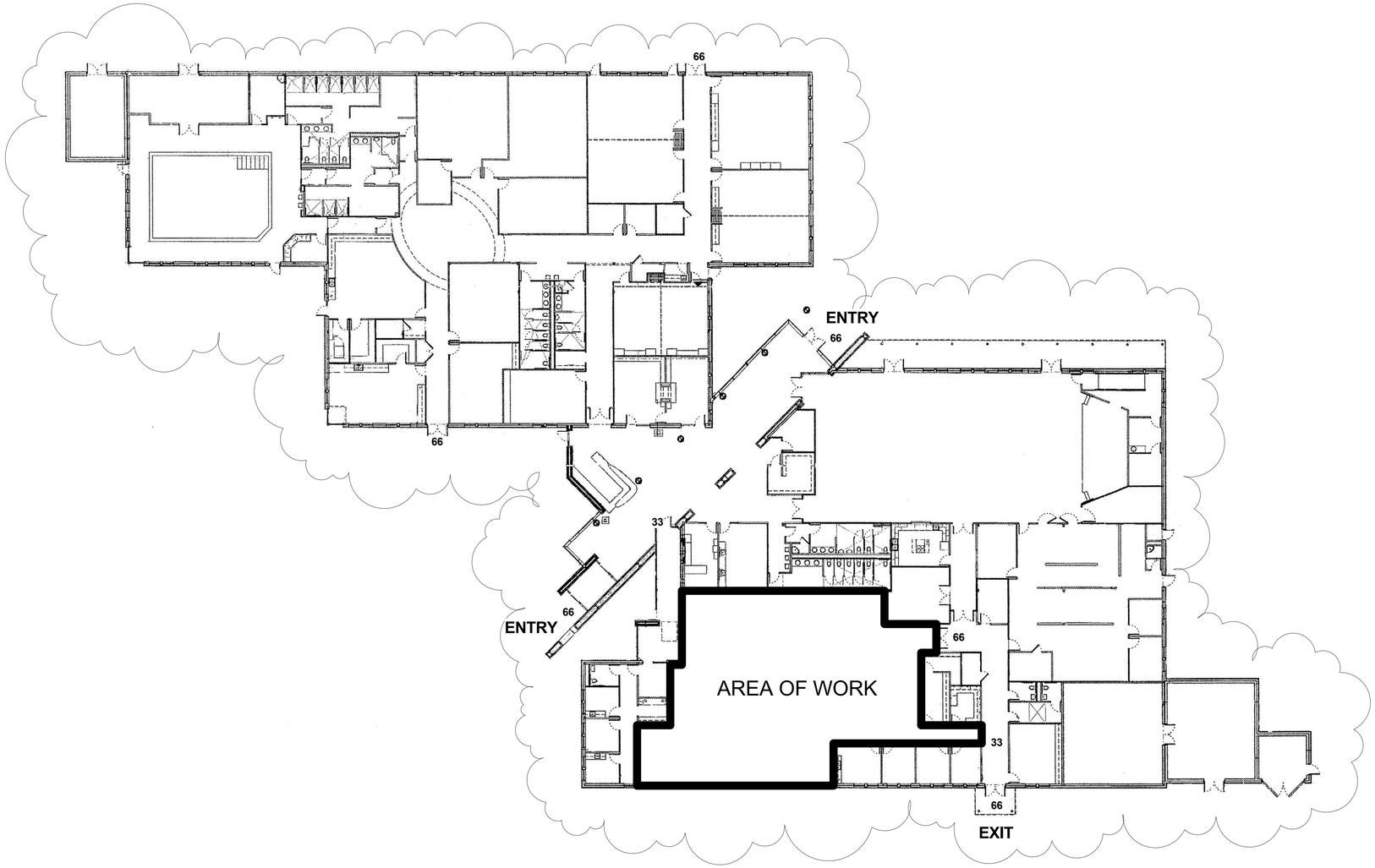
SITE LOCATION:



TS1

ABBREVIATION LEGEND

ABBR	DEFINITION	ABBR	DEFINITION	ABBR	DEFINITION	ABBR	DEFINITION
AB	ANCHOR BOLT	EJ	EXPANSION JOINT	MECH	MECHANICAL	REV	REVERSE
ACI	AMERICAN CONCRETE INSTITUTE	EL	ELEVATION	MFR	MANUFACTURER	RO	ROUGH OPENING
AFF	ABOVE FINISHED FLOOR	ELEC	ELECTRICAL	MIN	MINIMUM	RTU	ROOF TOP UNIT
AHU	AIR HANDLING UNIT	EQ	EQUAL	MISC	MISCELLANEOUS	SCHED	SCHEDULE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	ES	EQUIPMENT SUPPLIER	MO	MASONRY OPENING	SDI	STEEL DECK INSTITUTE
ARCH	ARCHITECTURAL	EW	EACH WAY	MTL	METAL	SIM	SIMILAR
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS	EXT	EXTERIOR	NIC	NOT IN CONTRACT	SJI	STEEL JOIST INSTITUTE
AWS	AMERICAN WELDING SOCIETY	FDN	FOUNDATION	NRP	NON-FIBERGLASS REINFORCED PLASTIC	SP	SPACES
BD	BOARD	FF	FINISHED FLOOR	NO	NUMBER	SPECS	SPECIFICATIONS
BFF	BELOW FINISHED FLOOR	FS	FAR SIDE	NS	NEAR SIDE	SS	STAINLESS STEEL
BL	BLOCK LINTEL	FTG	FOOTING	NTS	NOT TO SCALE	STRUC	STRUCTURAL
BLDG	BUILDING	FV	FIELD VERIFY	OC	ON CENTER	T&B	TOP AND BOTTOM
BO	BOTTOM OF	GA	GAUGE	OCH	ON CENTER HORIZONTALLY	THK	THICKNESS
BOS	BOTTOM OF STEEL OR BOTTOM OF STUD	GC	GENERAL CONTRACTOR	OCV	ON CENTER VERTICALLY	TO	TOP OF
BTM	BOTTOM	GYP	GYPSUM BOARD	OD	OUTSIDE DIAMETER	TOC/TC	TOP OF CONCRETE
BRG	BEARING	H	HEIGHT	OH	OPPOSITE HAND	TOF	TOP OF FOOTING
BRK	BRICK	HORIZ	HORIZONTAL	PCF	POUNDS PER CUBIC FOOT	TOGB	TOP OF GRADE BEAM
CJ	CONTROL JOINT	HSA	HEADED STUD ANCHOR	PLAM	PLASTIC LAMINATE	TOM	TOP OF MASONRY
CL	CENTERLINE	HSS	HOLLOW STRUCTURAL SECTION	PL	PLATE	TOP/TP	TOP OF PAVING
CLR	CLEAR	INFO	INFORMATION	PLF	POUNDS PER LINEAR FOOT	TOS	TOP OF STEEL OR TOP OF STUD
CMU	CONCRETE MASONRY UNIT	ISO	ISOLATION	PMEJ	PREMOLDED EXPANSION JOINT	TRANS	TRANSVERSE
COL	COLUMN	JBE	JOIST BEARING ELEVATION	PT	PRESSURE TREATED	WD	WOOD
CONC	CONCRETE	JST	JOIST	PSF	POUNDS PER SQUARE FOOT	TYP	TYPICAL
CONST	CONSTRUCTION	JT	JOINT	PSI	POUNDS PER SQUARE INCH	UNO	UNLESS NOTED OTHERWISE
CONT	CONTINUOUS	KSI	KIPS PER SQUARE INCH	PS	PROTECTIVE SURFACING	VERT	VERTICAL
DIA	DIAMETER	L	LENGTH	PVC	POLYVINYL CHLORIDE	VTR	VENT THROUGH ROOF
DS	DOWNSPOUT	LB	POUNDS	QTY	QUANTITY	W	WIDTH
EAS	EMERGENCY ACCESS SYSTEM	LONG	LONGITUDINAL	REF	REFER TO		
EDC	ELECTRICAL DISTRIBUTION CENTER	MAX	MAXIMUM	REINF	REINFORCING		
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM	MDF	MEDIUM DENSITY FIBERBOARD	REQD	REQUIRED		



2 OVERALL BASE PLAN
1" = 10'-0"

PROJECT CLOSEOUT:

CLOSE OUT DOCUMENTATION:

CONTRACTOR IS REQUIRED TO SUBMIT PROJECT RECORDS, PRODUCT INFO, WARRANTIES AND OTHER DOCUMENTATION IN HARD COPY AND ELECTRONIC FORMAT AS NEEDED FOR PROJECT CLOSEOUT. SPECIFIED SERVICE TO BE UTILIZED FOR ELECTRONIC DATA SUBMITTAL IS "FACILITY DATA TECHNOLOGY" BIDDERS SHALL CONTACT FDT AT www.FDT4Contractors.com, BY EMAIL AT support@FDTech1.com OR BY CALLING (404) 600-1256 ~ 1-844-FDTech1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH PREPARATION , UPLOAD & USE OF THE SYSTEM.

CONSTRUCTION PHASING :

REF SPECIFICATION SECTION 01100 SUMMARY OF WORK AND BELOW REQUIREMENTS:

THE WORK INCLUDES
DEMOLITION OF:
- EXISTING OFFICE PARTITIONS, DOORS & FRAMES, CEILINGS, FINISHES
- EXISTING UTILITIES AS NEEDED FOR NEW WORK
(BUILDING WIL BE OCCUPIED DOORING CONSTRUCTION, COORDINATE
THE TERMINATION OF POWER TO AFFECTED AREAS WITH USER)

CONSTRUCTION OF:
- NEW MULTI-PURPOSE CLASSROOMS
- ALL UTILITIES ASSOCIATED WITH THE REVISION OF NEW CLASSROOM
LAYOUT

OWNER MAY AWARD SEPARATE CONTRACTS FOR WORK AT THE SITE, WHICH WILL BE EXECUTED CONCURRENT WITH WORK OF THIS CONTRACT

WORK SHALL BE CONDUCTED IN A SINGLE PHASE UNLESS NOTED OTHERWISE OR REQUESTED BY OWNER PRIOR TO BID

GENERAL NOTES:

1. CONTRACTOR SHALL VISIT SITE PRIOR TO BID TO FAMILIARIZE THEMSELF WITH THE BUILDING AND IT'S CONSTRAINTS.

2. INTERPRETATION OF CONFLICTS: SHOULD CONFLICTS OCCUR IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL REQUEST INTERPRETATION BEFORE PROCEEDING WITH THE WORK. ALL SUCH REQUESTS SHALL FIRST BE PRECEDED BY A DILIGENT INVESTIGATION INTO THE CONTRACT DOCUMENTS. EVIDENCE OF SUCH INVESTIGATIONS SHALL BE CONTAINED IN ALL SUCH REQUESTS FOR FAILURE TO CARRY OUT THE WORK IN A SATISFACTORY MANNER. SHOULD CONFLICTS OCCUR IN AND/OR BETWEEN DRAWINGS AND/OR SPECIFICATIONS, THE CONTRACTOR IS DEEMED TO HAVE ESTIMATED ON THE MORE EXPENSIVE WAY OF DOING THE WORK UNLESS HE/SHE SHALL HAVE ASKED FOR, AND OBTAINED WRITTEN INTERPRETATION AND DECISION BEFORE SUBMISSION OF HIS/HER BID. AS TO WHICH MATERIAL AND METHOD WILL BE REQUESTED.

3. THOROUGHLY REVIEW CONSTRUCTION DOCUMENTS PRIOR TO BID. ALL BUILDING SYSTEMS (UTILITIES, MECHANICAL, ELECTRICAL, PLUMBING, ETC.) ARE PART OF THE WORK AND SHALL BE CONSTRUED AS THE CONTRACTORS RESPONSIBILITY TO PROVIDE ALL COST FOR THE WORK IN THE BID. THE WORK INCLUDES THE BUILDING SYSTEMS INDICATED OR SPECIFIED IN THE CONSTRUCTION DOCUMENTS. HOWEVER, SHOULD A SPECIFIC PART AND/OR MATERIAL OF THE BUILDING SYSTEMS NOT BE INDICATED, WHICH IS INTEGRAL TO THE BUILDING SYSTEM OPERATING AS IT IS INTENDED, THEN THE CONTRACTOR SHALL AT MINIMUM PROVIDE IN THEIR BID, MEDIUM GRADE INDUSTRY STANDARD PARTS AND/OR MATERIALS (CONSISTENT WITH DESIGN INTENT) AND INCLUDE ALL LABOR IN ORDER PROVIDE A FINAL COMPLETE WORKING BUILDING SYSTEM, SUCH THAT IT SHALL OPERATE AS INTENDED.

4. THE CONTRACTOR IS RESPONSIBLE FOR THE VERIFICATION OF ALL EXISTING DIMENSIONS PRIOR TO BID.

ADMINISTRATIVE ACTIONS AND SUBMITTALS:

REF SPECIFICATION SECTION 01250 APPLICATION FOR PAYMENT AND BELOW REQUIREMENTS:

ADMINISTRATIVE ACTIONS AND SUBMITTALS, THAT MUST PRECEDE OR COINCIDE WITH SUBMITTAL OF FIRST APPLICATION FOR PAYMENT, INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

1. A SITE SPECIFIC SAFETY PLAN PER OSHA REQUIREMENTS
2. SCHEDULE OF VALUES
3. SUBMITTAL REGISTRY
4. CONTRACTORS CONSTRUCTION SCHEDULE
5. INSURANCE AND BONDS
6. ALL REQUIRED UPFRONT PERMITS

REVISIONS

NO.:	DESCRIPTION:	DATE:
1	PERMIT COMMENT	12/3/18

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0347
REGISTERED ARCHITECT

GENERAL INFORMATION

LOU WALKER SENIOR CENTER
CLASSROOM RENOVATIONS
2538 PANOLA RD | LITHONIA, GA 30058

BROWN DESIGN GROUP
ARCHITECTS • PLANNERS • INTERIOR DESIGNERS
3099 WASHINGTON ROAD, EAST POINT, GA 30344
(O) 404-559-1825 (F) 404-761-0020 (E) THEBROWNDESIGNGROUP.COM

FOR CONSTRUCTION

CHECKED:	Checker
DRAWN:	Author
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JOB NO.:	B0903-70

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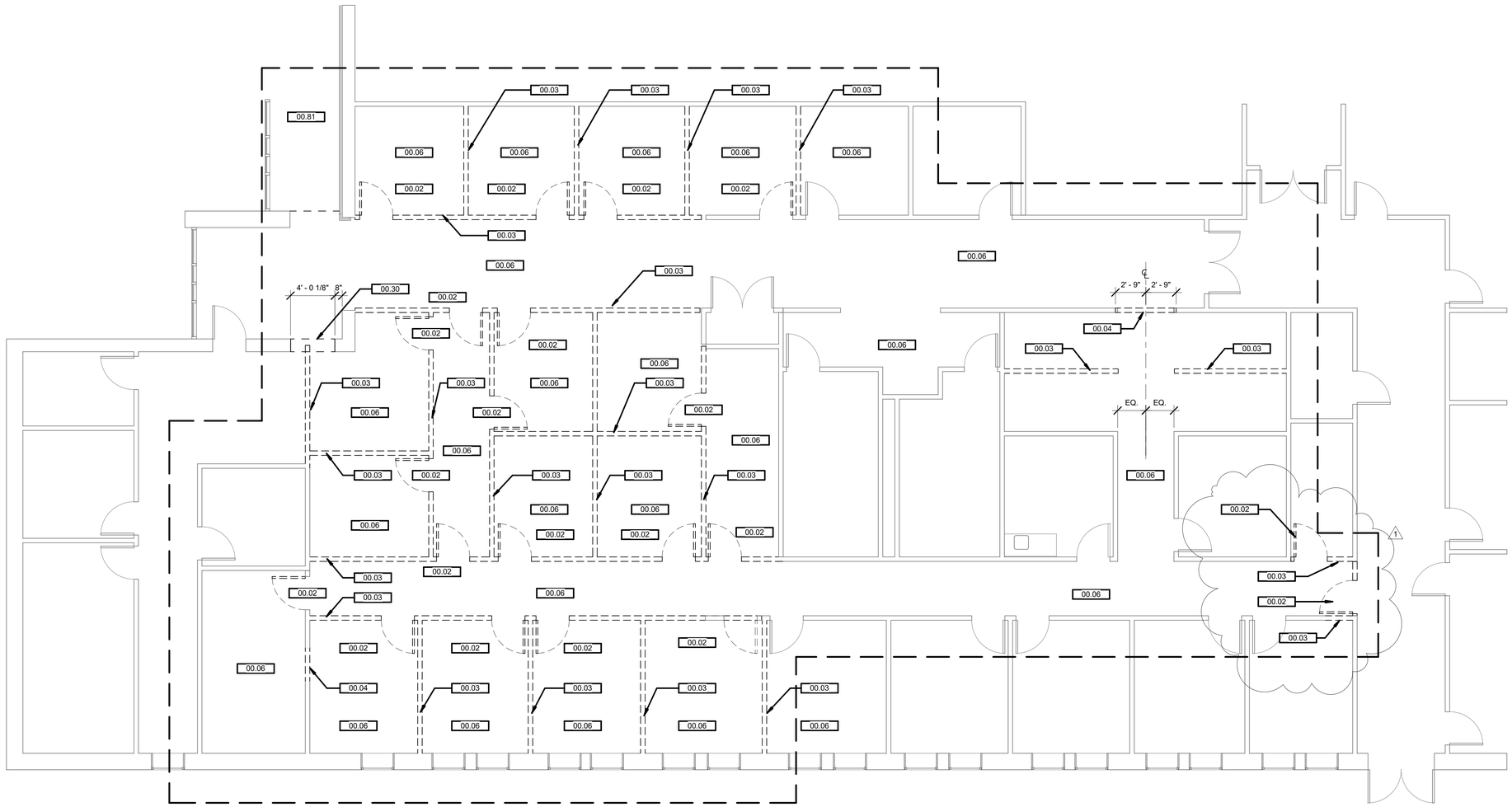


1 DEMO FLOOR PLAN
3/16" = 1'-0"

GENERAL NOTES

1. CONTRACTOR SHALL PATCH AND REPAIR WALL & FLOOR SURFACES DAMAGED BEFORE AND DURING DEMOLITION.

DEMOLITION LEGEND

= = = = WALL DEMO

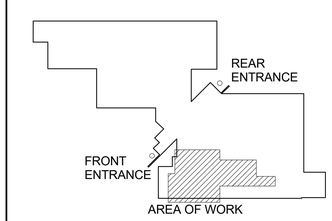
DOOR DEMO

AREA OF WORK

SHEET NOTES

00.02	REMOVE EXISTING DOOR AND ASSOCIATED HARDWARE (SALVAGE/SELECT FOR REINSTALLATION)
00.03	REMOVE EXISTING WALL OR WALL PARTITION
00.04	REMOVE PORTION OF EXISTING WALL, REF PLAN FOR EXTENT; COORDINATE LOCATION WITH NEW WORK
00.06	REMOVE EXISTING FLOORING AND WALL BASE
00.30	SAW CUT EXISTING SECTION OF MASONRY WALL TO CREATE NEW DOOR OPENING. COORDINATE EXTENT WITH NEW WORK.
00.81	DISCONECT MAGNETIC LOCK AT DOOR TO CORRIDOR FORM MAIN LOBBY. TERMINATE WIRES AT NEAREST JUNCTION BOX

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

FOR CONSTRUCTION

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NO.:	DESCRIPTION:	DATE:
1	PERMIT COMMENT	12/3/18

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0,147,00
REGISTERED ARCHITECT

DEMOLITON FLOOR PLAN

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

2538 PANOLA RD | LITHONIA, GA 30058

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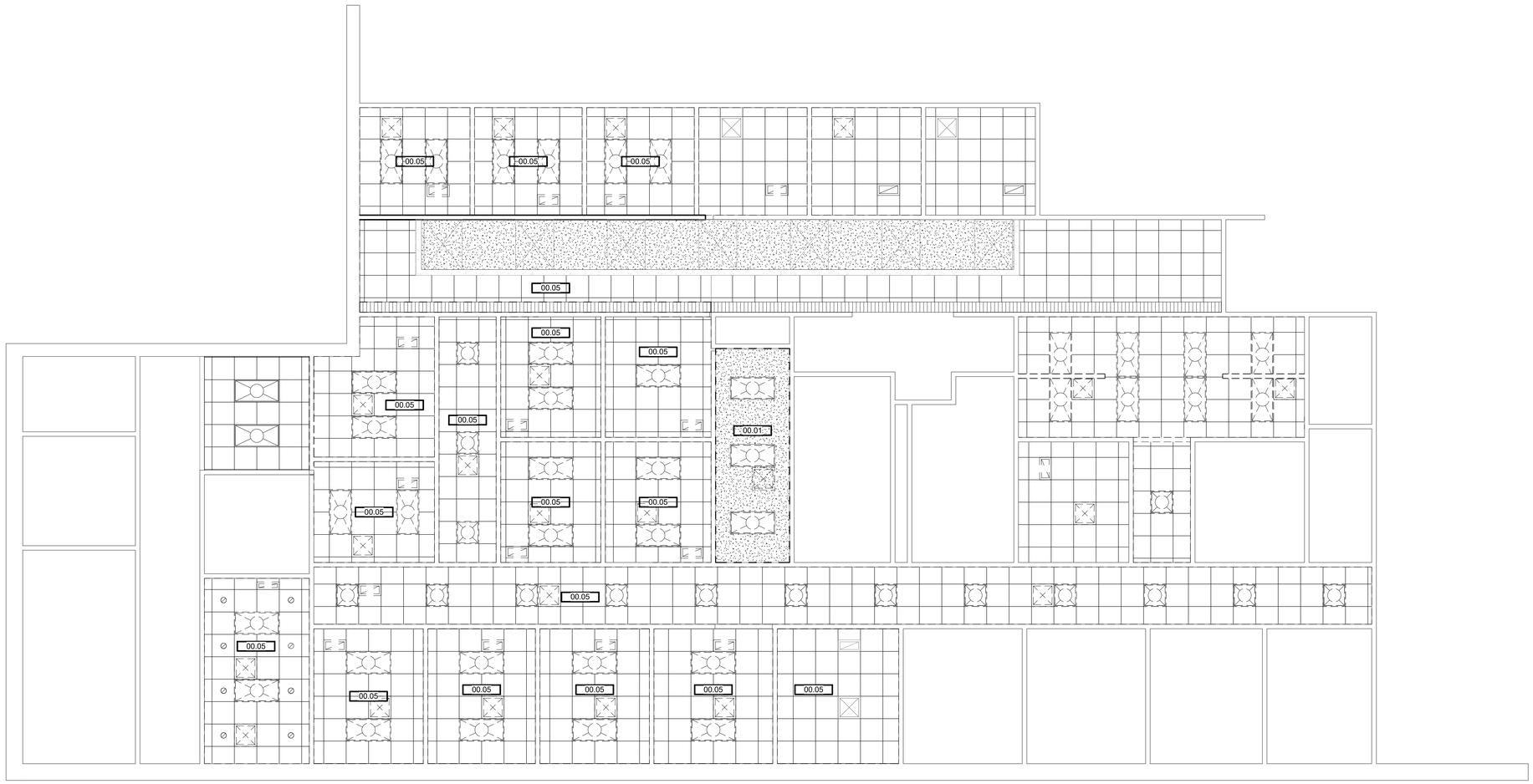


2 DEMO REFLECTIVE CEILING PLAN
3/16" = 1'-0"

GENERAL NOTES

1. CONTRACTOR SHALL PATCH AND REPAIR WALL & FLOOR SURFACES DAMAGED BEFORE AND DURING DEMOLITION.

DEMOLITION LEGEND

- DEMOLITION OF AREA OF WORK - INTERIOR
- CEILING
- LIGHTS
- RETURN
- SUPPLY
- DRYWALL

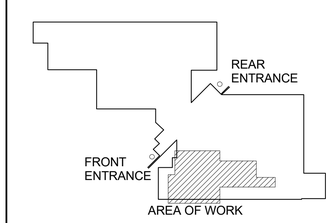
NOTE: COORDINATE WITH MEP DRAWINGS FOR REMOVAL OF MECHANICAL AND ELECTRICAL EQUIPMENT

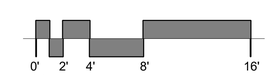
SHEET NOTES

00.01 REMOVE EXISTING GYPSUM BOARD CEILING AND SUSSPENSION SYSTEM

00.05 REMOVE EXISTING CEILING, CEILING TILE, CEILING GRID

KEY PLAN





SCALE: 3/16" = 1' - 0"

REVISIONS

NO.:	DESCRIPTION:	DATE:

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0-0-0000
REGISTERED ARCHITECT

DEMOLITION REFLECTED CEILING PLAN

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS
2538 PANOLA RD | LITHONIA, GA 30058

FOR CONSTRUCTION

BROWN DESIGN GROUP
ARCHITECTS · PLANNERS · INTERIOR DESIGNERS
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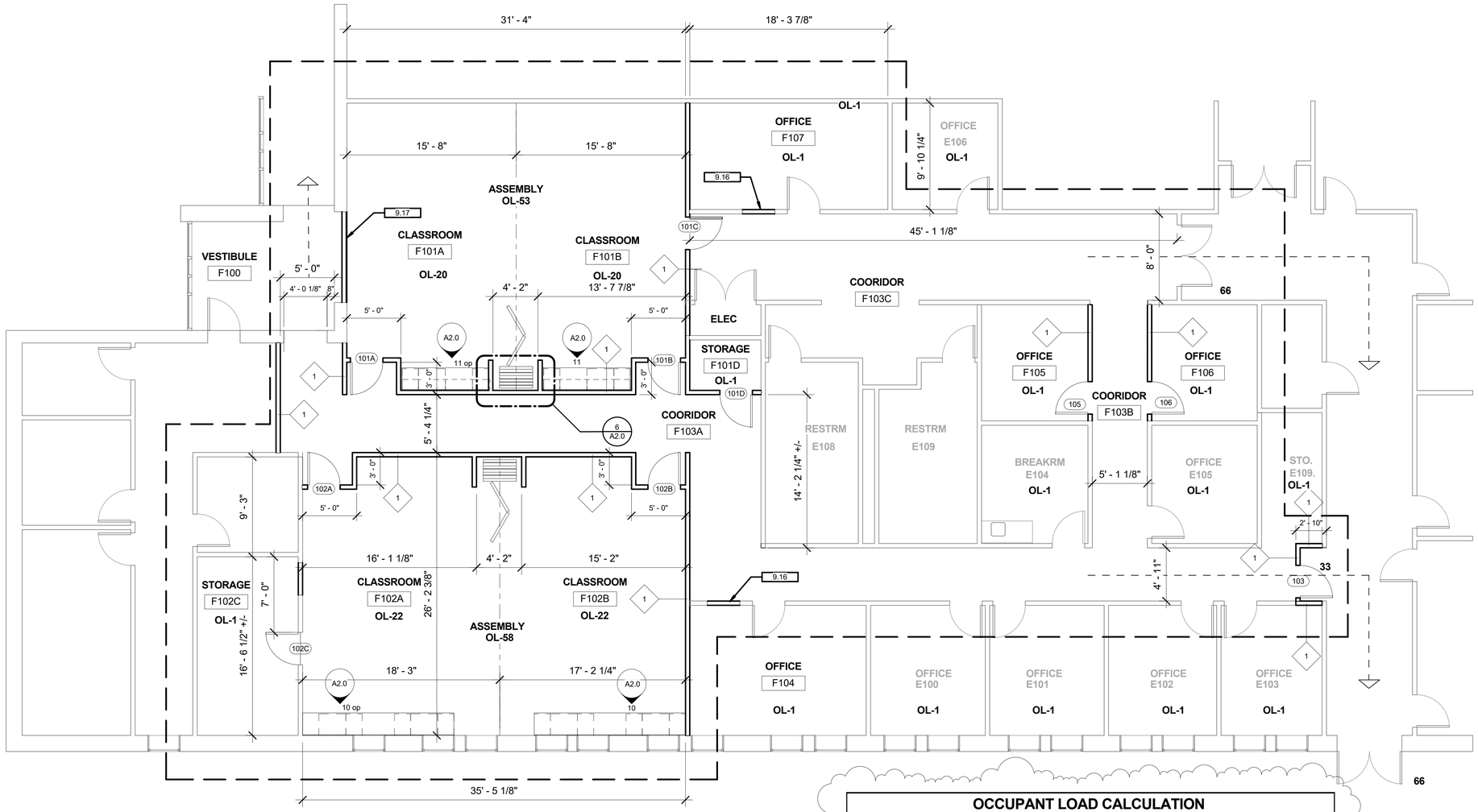
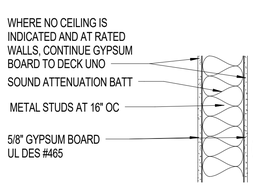


1 NEW WORK FLOOR PLAN
3/16" = 1'-0"



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2 PARTITION TYPES
1/8" = 1'-0"

LIFE SAFETY LEGEND

PRIMARY EXIT ROUTE

33 NUMBER BY DOOR INDICATES CLEAR EGRESS WIDTH PROVIDED (INCHES)

GENERAL NOTES

1. CONTRACTOR SHALL PATCH AND REPAIR WALL & FLOOR SURFACES DAMAGED BEFORE AND DURING DEMOLITION.

NEW WORK LEGEND

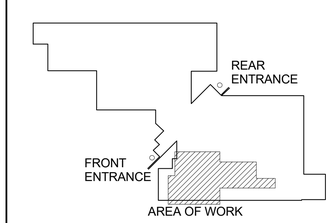
WALL TAG

DOOR TAG

OCCUPANT LOAD CALCULATION

FUNCTION OF SPACE	FLOOR AREA PER OCCUPANT	CALCULATION: FLOOR AREA / FLOOR AREA PER OCCUPANT	OCCUPANT LOAD
ACCESSORY STORAGE AREAS, MECHANICAL EQUIPMENT ROOM	300		
ELEC		18 SF / 300 =	1
STORAGE F101D		154 SF / 300 =	1
STORAGE F102C		30 SF / 300 =	1
STORAGE 109B		67 SF / 300 =	1
ASSEMBLY (UNCONCENTRATED)	15		
CLASSRMS F101A & F101B		400 + 400 SF / 15 =	53
CLASSRMS F102A & F102B		440 + 440 SF / 15 =	58
BUSINESS AREAS	100		
OFFICE F104		196 SF / 100 =	1
OFFICE F105		106 SF / 100 =	1
OFFICE F106		106 SF / 100 =	1
OFFICE F107		180 SF / 100 =	1
OFFICE E100		127 SF / 100 =	1
OFFICE E101		127 SF / 100 =	1
OFFICE E102		120 SF / 100 =	1
OFFICE E103		112 SF / 100 =	1
OFFICE E105		106 SF / 100 =	1
OFFICE E106		106 SF / 100 =	1
RESTROOM E108			
RESTROOM E109			
BREAKRM E104			
TOTAL OCCUPANT LOAD			**125**

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

REVISIONS

NO.:	DESCRIPTION:	DATE:
1	PERMIT COMMENT	12/3/18

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0,0,0,0
REGISTERED ARCHITECT

NEW WORK FLOOR PLAN

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

2538 PANOLA RD | LITHONIA, GA 30058

FOR CONSTRUCTION

BROWN DESIGN GROUP
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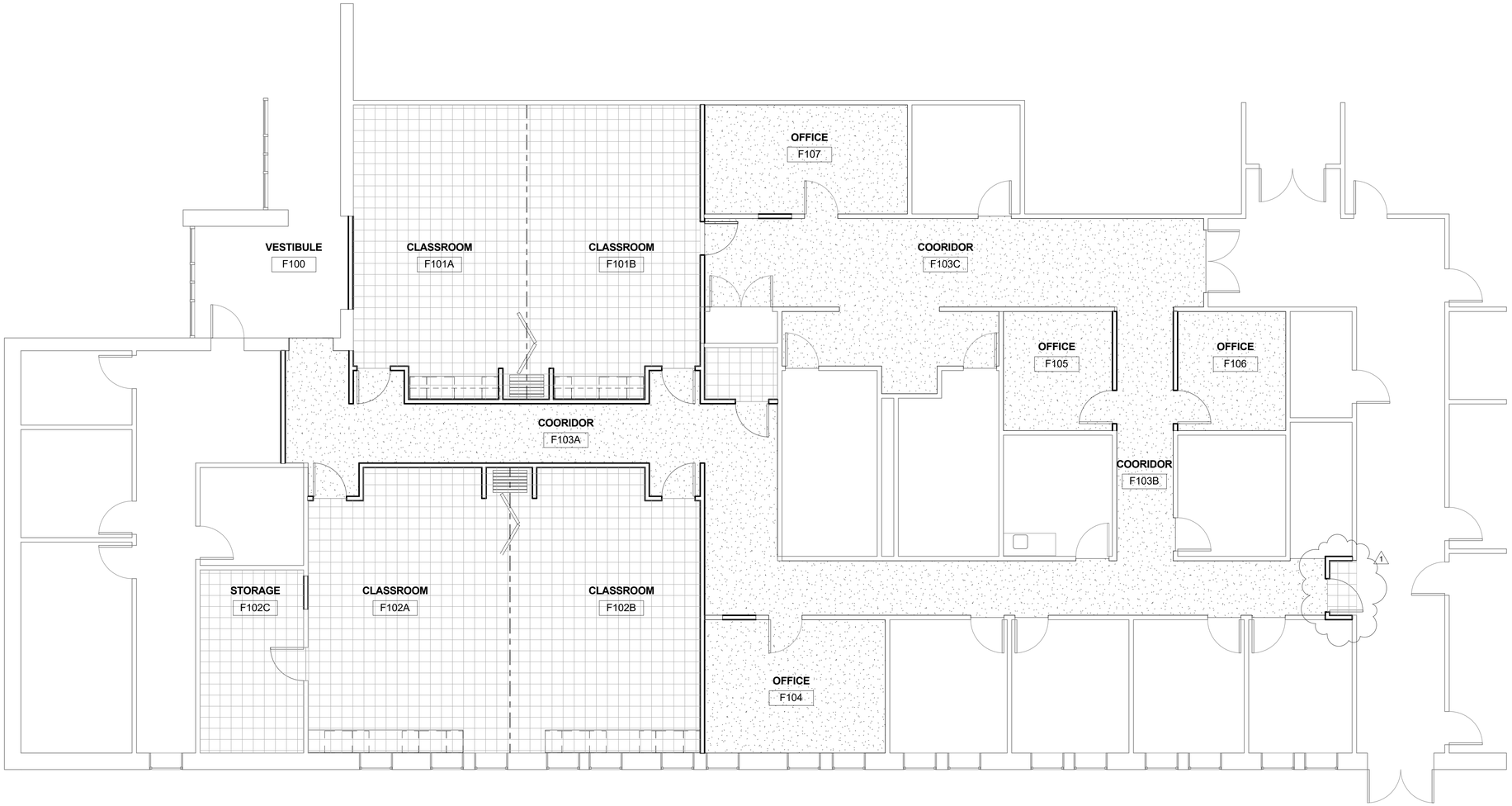


1 NEW WORK FINISH FLOOR PLAN
3/16" = 1'-0"

NEW WORK LEGEND

- 2x2 CARPET TILE (CPT)
- VINYL COMP. TILE

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR FINISH	BASE FINSIH	Wall Finish	Ceiling Finish	Comments
F100	VESTIBULE	CPT	RBC	PAINT	CT	
F101A	CLASSROOM	VCT	RBC	PAINT	CT	
F101B	CLASSROOM	VCT	RBC	PAINT	CT	
F101D	STORAGE	VCT	RBC	PAINT	CT	
F102A	CLASSROOM	VCT	RBC	PAINT	CT	
F102B	CLASSROOM	VCT	RBC	PAINT	CT	
F102C	STORAGE	VCT	RBC	PAINT	CT	
F103A	COORIDOR	CPT	RBC	PAINT	CT	
F103B	COORIDOR	CPT	RBC	PAINT	CT	
F103C	COORIDOR	CPT	RBC	PAINT	CT	
F104	OFFICE	CPT	RBC	PAINT	CT	
F105	OFFICE	CPT	RBC	PAINT	CT	
F106	OFFICE	CPT	RBC	PAINT	CT	
F107	OFFICE	CPT	RBC	PAINT	CT	

0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

REVISIONS

NO.:	DESCRIPTION:	DATE:
1	PERMIT COMMENT	12/3/18

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0,0,0,0
REGISTERED ARCHITECT

NEW WORK FINISH PLAN

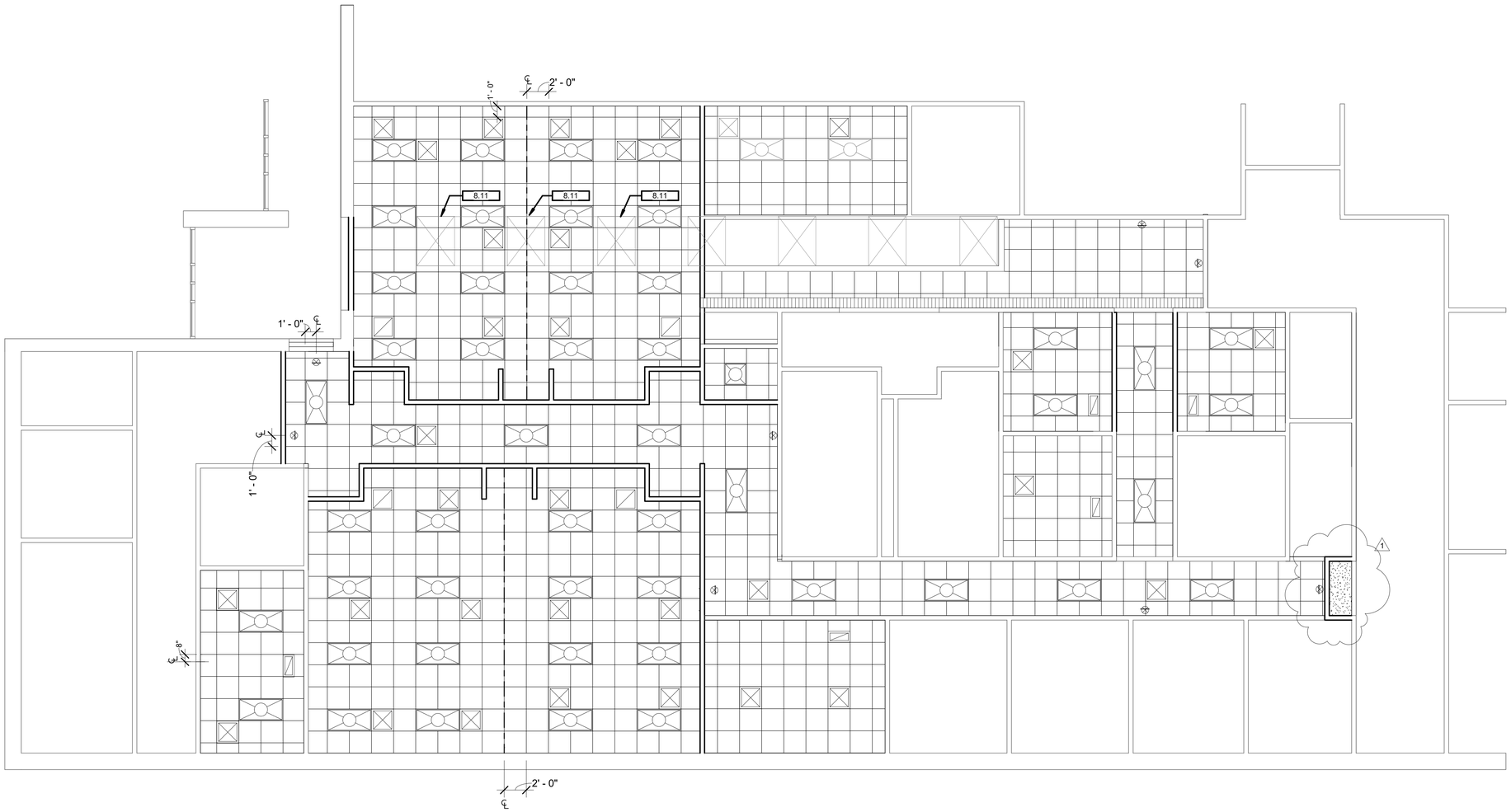
LOU WALKER SENIOR CENTER
CLASSROOM RENOVATIONS
2538 PANOLA RD | LITHONIA, GA 30058

FOR CONSTRUCTION

BROWN DESIGN GROUP
ARCHITECTS • PLANNERS • INTERIOR DESIGNERS
3099 WASHINGTON ROAD, EAST POINT, GA 30344
(O) 404-559-1805 (F) 404-761-0020 (E) THEBROWNDESIGNGROUP.COM

CHECKED: CLC
DRAWN: MS
SCALE: As indicated
DWG. DATE: 09/06/2017
PRINT DATE: 12/13/2018 12:32:02 PM
JOB NO.: B0903-70

SHEET
A1.2



1 NEW WORK REFLECTIVE CEILING PLAN
3/16" = 1'-0"

NEW WORK LEGEND

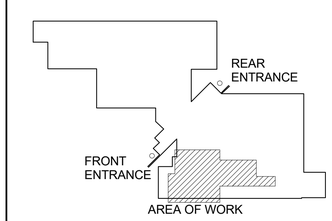
- ACOUSTIC CEILING TILE
- SUSPENDED GYP. BD. CEILING
- LIGHTS
- RETURN
- SUPPLY
- EXIT LIGHT FIXTURE

SHEET NOTES

8.11 INSTALL WINDOW TINT AT CLEARSTORY WINDOW

GENERAL NOTES

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

FOR CONSTRUCTION

REVISIONS

NO.:	DESCRIPTION:	DATE:
1	PERMIT COMMENT	12/3/18

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0,0,0,0
REGISTERED ARCHITECT

NEW WORK REFLECTED CEILING PLAN

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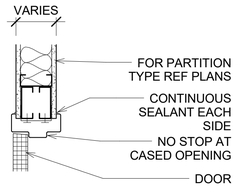
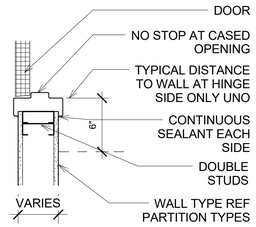
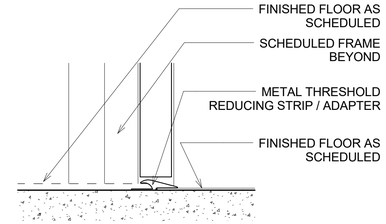
SHEET
A1.3



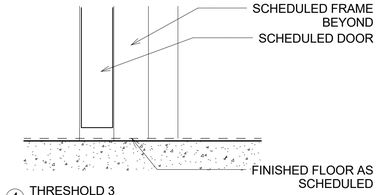
1 INTERIOR HEAD - MTL STUD
1 1/2" = 1'-0"



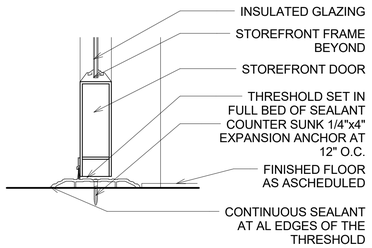
2 INTERIOR JAMB - MTL STUD
1 1/2" = 1'-0"



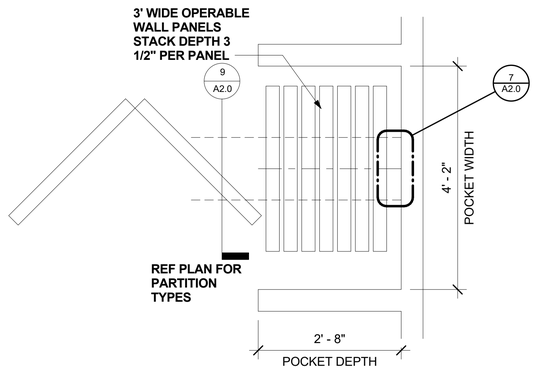
3 THRESHOLD 2
3" = 1'-0"



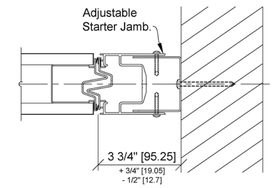
4 THRESHOLD 3
3" = 1'-0"



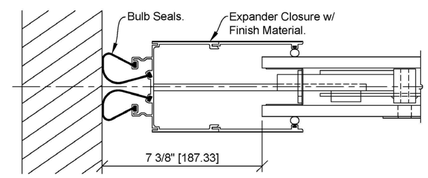
5 THRESHOLD 4
3" = 1'-0"



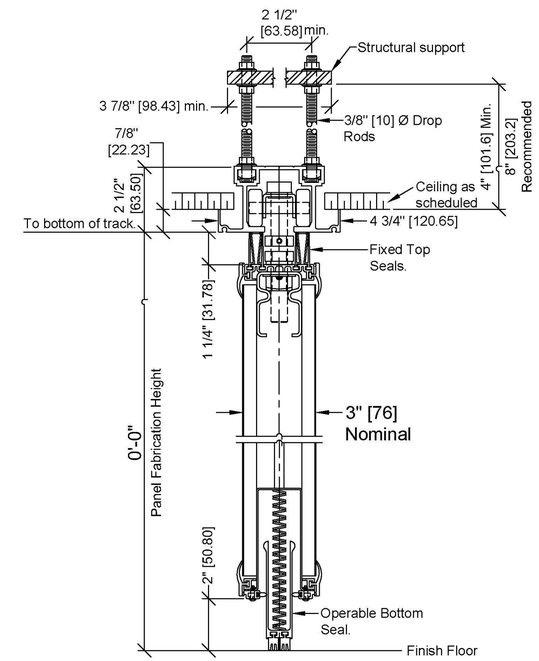
6 OPERABLE FOLDING PARTITION
3/4" = 1'-0"



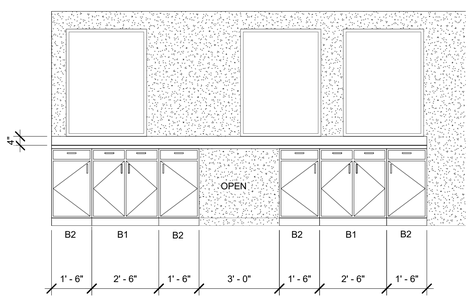
7 OPERABLE WALL JAMB
1 1/2" = 1'-0"



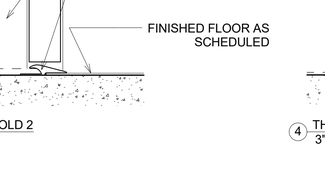
8 OPERABLE WALL JAMB
1 1/2" = 1'-0"



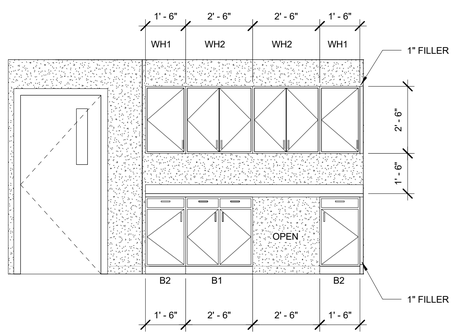
9 OPERABLE WALL SECTION
1 1/2" = 1'-0"



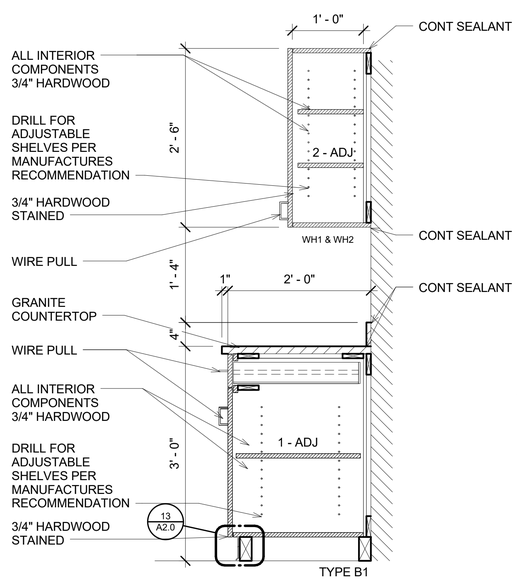
10 CABINET ELEVATION RM F102A & B
3/8" = 1'-0"



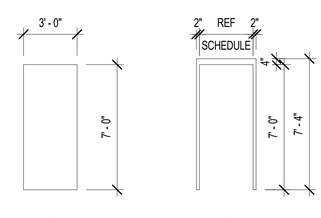
13 TOE SPACE
3" = 1'-0"



11 CABINET ELEVATION RM F101A & B
3/8" = 1'-0"



12 CABINET SECTION
1" = 1'-0"

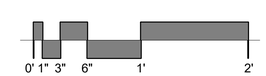


14 DOOR & DOOR FRAME
1/4" = 1'-0"

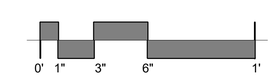
DOOR SCHEDULE

Mark	Width	Height	Construction Type	Finish	Frame Type	Comments
101A	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
101B	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
101C	3' - 0"	7' - 0"	SCW	Factory Stain & Poly	METAL	Match existing height and finish
101D	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Match existing height and finish
102A	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
102B	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
102C	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
103	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Match existing height and finish
105	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights
106	3' - 0"	6' - 8"	SCW	Factory Stain & Poly	METAL	Existing Reinstalled, verify existing door heights

SCALE: 3/8" = 1' - 0"



SCALE: 1 1/2" = 1' - 0"



SCALE: 3" = 1' - 0"

REVISIONS

NO.:	DESCRIPTION:	DATE:

STATE OF GEORGIA
COYL COOPER, JR
CERTIFICATE NO. 0-0-0000
REGISTERED ARCHITECT

DOORS, SCHEDULE & DETAILS

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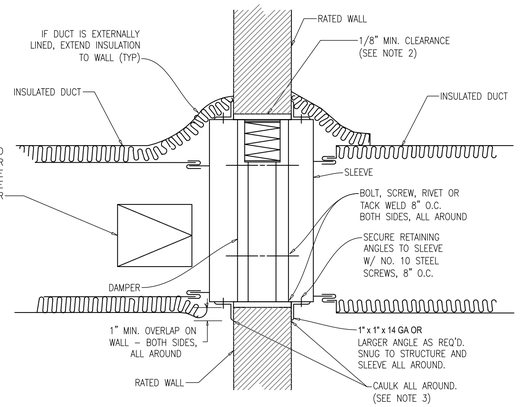
A2.0

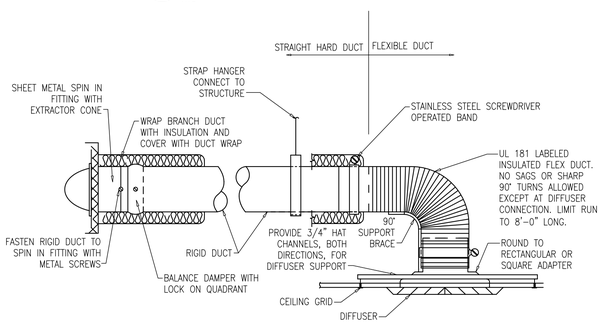
MECHANICAL SYMBOLS

- 14 x 20 / 14 x 20 — DOUBLE LINE OR SINGLE LINE DUCT, WIDTH X DEPTH AS SHOWN ON PLAN
- R / R — DOUBLE LINE OR SINGLE LINE DUCT INCLINED RISE WITH RESPECT TO DIRECTION OF ARROW
- D / D — DOUBLE LINE OR SINGLE LINE DUCT INCLINED DOWN WITH RESPECT TO ARROW
- SPIN–IN FITTING AND VOLUME DAMPER WITH RUN OUT – ADJUST FOR CFM AS NOTED AT DIFFUSER. FOR RUNOUT SIZE SEE AIR DEVICE SCHEDULE ON THE PLANS
- SUPPLY AIR FLOW
- RETURN OR EXHAUST AIR FLOW
- DOUBLE LINE OR SINGLE LINE DUCT WITH VOLUME DAMPER
- M / M — DOUBLE LINE OR SINGLE LINE DUCT WITH VOLUME DAMPER
- MOTORIZED DAMPER
- LOUVER, FIXED W/BIRDSCREEN
- FD / FD — DOUBLE LINE OR SINGLE LINE DUCT WITH FIRE DAMPER (FD) OR FIRE SMOKE DAMPER (FSD) AS NOTED
- SD — SMOKE DETECTOR
- T — THERMOSTAT
- CO — CO DETECTOR
- CO_2 — CO2 MONITOR
- EF–1 — ROOF MOUNTED KITCHEN EXHAUST FAN
- KSF–## — ROOF MOUNTED MAKE–UP AIR FAN
- EF–## — WALL MOUNTED PROPELLER FAN
- SIZE / CFM — CEILING SUPPLY DIFFUSER OR REGISTER
- SIZE / CFM — CEILING RETURN OR EXHAUST AIR GRILLE OR REGISTER
- SIZE / CFM — EXHAUSTNOR RETURN AIR GRILLE OR REGISTER (WIDTH AND HEGHT, INCHES)
- SIZE / CFM — SUPPLY GRILLE OR REGISTER
- DOUBLE LINE OR SINGLE LINE DUCT SQUARE ELBOW WITH TURNING VANES
- DOUBLE LINE FLEXIBLE DUCT CONNECTION TO EQUIPMENT.
- DOUBLE LINE OR SINGLE LINE DUCT TRANSITION, SIZE AS NOTED



1. MAKE DUCT CONNECTION TO SLEEVE AIR TIGHT.
2. CLEARANCE AROUND DAMPER BASED ON 1/8" PER FT. OF WIDTH (OR HEIGHT) UNLESS OTERWISE NOTED IN THE LISTING OF THE ASSEMBLY.
3. CAULKING MATERIAL: DOW–CORNING 999, DOW–CORNING SILASTIC 732RTV OR GERTV108. PRESS SEALANT INTO PLACE TO DISPEL ANY AIR.
4. DAMPER SHALL BE EQUIPPED WITH A 165 °F FUSIBLE LINK.

WALL FIRE DAMPER INSTALLATION DETAIL
– / M#.# NTS



TYPICAL DIFFUSER CONNECTION DETAIL
– / M#.# NTS

GENERAL NOTES

1. FURNISH AND INSTALL, HVAC EQUIPMENT, EXHAUST FANS, AIR DUCTS, MATERIALS AND APPURTENANCES AS SPECIFIED AND AS SHOWN ON THE DRAWINGS. COORDINATE WITH ARCHITECTURAL, PLUMBING AND ELECTRICAL DRAWINGS TO GET A COMPLETE UNDERSTANDING OF THE WORK.
2. PROVIDE QUALIFIED, LICENSED AND EXPERIENCED WORKMEN WITH ADEQUATE SUPERVISION TO INSTALL AND COMPLETE THE WORK AS SPECIFIED. BRING ALL DISCREPANCIES AND CONFLICTS TO THE ATTENTION OF THE ENGINEER PRIOR TO ANY INSTALLATION OF MATERIALS OR EQUIPMENT.
3. COMPLY WITH ALL MANUFACTURERS INSTRUCTIONS AND REQUIREMENTS FOR INSTALLATION AND START UP OF EQUIPMENT.
4. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH FOLLOWING STATE AND LOCAL CODES:
   INTERNATIONAL BUILDING CODE (IBC) 2012 EDITION GEORGIA STATE AMENDMENTS 2014 & 2015.
   INTERNATIONAL MECHANICAL CODE (IMC) 2012 EDITION WITH GEORGIA STATE AMENDMENTS 2015.
   INTERNATIONAL FUEL GAS CODE (IFGC) 2012 EDITION WITH GEORGIA STATE AMENDMENTS 2014 & 2015.
   INTERNATIONAL NATIONAL ELECTRIC CODE (NEC) 2014
   INTERNATIONAL FIRE CODE (IFC) 2012 EDITION WITH GEORGIA STATE AMENDMENTS 2014.
   INTERNATIONAL ENERGY CODE (IEC) 2009 EDITION WITH GEORGIA STATE AMENDMENTS 2011 & 2012.
5. CONTRACTOR SHALL COORDINATE MECHANICAL WORK WITH ALL OTHER TRADES PRIOR TO FABRICATION AND INSTALLATION. COORDINATE THE SIZE OF ALL WALL OPENINGS, ROOF OPENINGS AND EQUIPMENT PADS WITH ACTUAL EQUIPMENT SHOP DRAWINGS.
6. IN AREAS WITHOUT CEILING PROVIDE HARD ROUND OR RECTANGULAR UN–INSULATED DUCT UNLESS OHTER WISE NOTED.
7. MOTOR STARTERS AND DISCONNECTS SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR, FOR ALL EQUIPMENT PROVIDED UNDER DIVISION 15 AND INSTALLED BY THE ELECTRICAL CONTRACTOR. INDICATE ON THE SHOP DRAWING SUBMITTAL COORDINATION WITH DIVISION 16, REGARDING SIZE, VOLTAGE AND TYPE OF EQUIPMENT REQUIRED TO BE INSTALLED PRIOR TO ORDERING.
8. PROVIDE LOW VOLTAGE CONTROL WIRING, THERMOSTATS, DAMPERS, CONTROL TRANSFORMERS, ETC. NECESSARY TO ACHIEVE THE SEQUENCE OF OPERATION FOR EACH UNIT. COMPLY WITH REQUIREMENTS OF THE NEC.
9. ROUTE FULL SIZE CONDENSATE DRAINS WITH ALL NECESSARY TRAPS AND VENTS TO FLOOR DRAIN OR BUILDING EXTERIOR. PROVIDE CONDENSATE PUMP AS REQUIRED TO LIFT CONDENSATE TO THE NEAREST DRAIN WHERE GRAVITY DISCHARGE IS NOT POSSIBLE. CONTROL POWER TRANSFORMER SHALL BE SIZED TO OPERATE CONDENSATE PUMP WHERE REQUIRED.
10. PROVIDE MANUAL VOLUME DAMPERS AT ALL BRANCH TAKE–OFFS AND RUN–OUTS FROM THE MAIN DUCT TO AIR DISTRIBUTION DEVICES.
11. PROVIDE ALUMINUM WALL LOUVERS WITH MOTOR OPERATED DAMPERS (MOD) AND BIRD SCREEN. MINIMUM FREE AREA SHALL BE EQUAL TO 40% OF TOTAL. PROVIDE WITH KYNAR FINISH, COLOR TO BE SELECTED BY ARCHITECT. MOD'S SHALL BE 110 V/1 PH WITH POWER OPEN AND SPRING RETURN (HONEYWELL ML4125). COORDINATE WITH DIVISION 16 TO HAVE POWER PROVIDED FOR THE DAMPER WITHOUT ADDITIONAL COST TO THE OWNER.

MECHANICAL ABBREVIATIONS

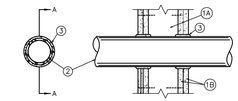
APD	AIR PRESSURE DROP
AHU	AIR HANDLING UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
CFM	CUBIC FEET PER MINUTE
CU	CONDENSING UNIT
DB	DRY BULB
DWG	DRAWING
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE
FD	FIRE DAMPER
FLA	FULL LOAD AMPERES
G	GROUND
HP	HORSE POWER
HZ	HERTZ
IN	INCH
KW	KILOWATTS
MAU	MAKE–UP AIR UNIT
MCA	MINIMUM CIRCUIT AMPS
MBH	THOUSAND BTU PER HOUR
MD	MOTORIZED DAMPER
MVD	MANUAL VOLUME DAMPER
NC	NOISE CRITERIA
OBD	OPPOSED BLADE DAMPER
PH	PHASE
RLA	RATED LOAD AMPERES
RTU	ROOF TOP UNIT
TD	TRANSFER DUCT
UH	UNIT HEATER
V	VOLTS
WB	WET BULB
WPD	WATER PRESSURE DROP
WG	WATER GAUGE
VVT	VARIABLE VOLUME TERMINAL UNITS

AIR DEVICE SCHEDULE

SUPPLY REGISTERS				RETURN/EXHAUST REGISTER & GRILLE			
CFM RANGE	REGISTER SIZE	BRANCH DUCT SIZE	NECK SIZE	CFM RANGE	REGISTER/ GRILLE SIZE	BRANCH DUCT SIZE	NECK SIZE
0–200	12X6	8"ø	8X6	UP TO 80	12X6	6"ø	6x6
201–325	18X6	10"ø	12X6	81–140	14X6	8"ø	8x8
326–575	24X8	12"ø	12X8	141–220	18X6	10"ø	10x10
576–850	24X10	14"ø	18X10	221–320	20X8	10"ø	12x12
851–1000	26X12	16"ø	22X10	321–480	22X10	12"ø	18x12
CEILING DIFFUSERS				481–750	24X12	14"ø	18x18
CFM RANGE	BRANCH DUCT SIZE	ALTERNATE DUCT SIZE	NECK SIZE	751–1250	24X24	16"ø	22x22
UP TO 250	10x6	8"ø	8"ø				
251–380	10X8	10"ø	10"ø				
381–550	14X10	12"ø	12"ø				
551–740	16X10	14"ø	14"ø				

1. SIZE OF DIFFUSERS AND RETURN GRILLES SHALL COMPLY WITH THIS SCHEDULE UNLESS NOTED OTHERWISE. DIFFUSERS ARE 4–WAY DISCHARGE UNLESS NOTED AS 3–WAY OR 2–WAY. GO TO NEXT LARGER NECK SIZE FOR 2–WAY OR 3–WAY DIFFUSERS.
2. UNLESS NOTED OTHERWISE, ALL DIFFUSERS IN THE SAME SPACE SHALL BE THE SAME SIZE AND TYPE, REGARDLESS OF CFM, USING LARGEST SIZE FROM THE TABLE ABOVE FOR THE CFM NOTED.
3. AIR RETURN AND EXHAUST GRILLES ARE BASED ON 450 FPM AIR VELOCITY AND 72% FREE AREA. (TYPICAL OF 1/2" EGG CRATE GRILLE).
4. PROVIDE BRANCH DUCT ACCORDING TO THE SIZES SHOWN IN THIS SCHEDULE.
5. USE RETURN/EXHAUST REGISTER AND DIFFUSER WITH OBD IN DRYWALL OR INACCESSIBLE CEILINGS. USE RETURN/EXHAUST GRILLES AND DIFFUSERS WITHOUT OBD IN LAY–IN OR ACCESSIBLE CEILINGS. WHERE GRILLES AND DIFFUSERS WITHOUT OBD ARE USED, INSTALL MVD IN BRANCH DUCT OR SPIN–IN FITTING WITH MVD IN BRANCH DUCT.
6. CEILING DIFFUSERS(CD): TITUS / MODEL TMS 2'X2'
7. CEILING DIFFUSERS(CD–1): TITUS / MODEL TMS 2'X1'
8. CEILING DIFFUSERS(CD–2): TITUS / MODEL TMS 1'X1'
9. DUCT MOUNTED AIR SUPPLY REGISTERS (SR): TITUS / MODEL 300/350
10. CEILING MOUNTED RETURN GRILLE (RG) & EXHAUST GRILLE (EG): TITUS / MODEL 50F
11. LINEAR SLOT DIFFUSER: 2 – 1" LINEAR SLOT LENGTH AS INDICATED – TITUS MODEL ML–39–SP

F RATINGS – 1, 2, 3 AND 4 HR (SEE ITEMS 2 AND 3)
T RATINGS – 0, 1, 2, 3 AND 4 HR (SEE ITEM 3)
L RATING AT AMBIENT – LESS THAN 1 cfm/sq ft
L RATING AT 400 F – LESS THAN 1 cfm/sq ft



METAL PIPE PENETRATION THRU RATED WALL UL SYSTEM # W-L-1001
N.T.S.

1. WALL ASSEMBLY – THE 1, 2, 3 OR 4 HR FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
   A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS (MAX 2 H FIRE RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC WITH NOM 2 BY 4 IN. LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3–5/8" WIDE BY 1–3/8" DEEP CHANNELS SPACED MAX 24 IN. OC.
   B. WALLBOARD, GYPSUM* – NOM 1/2" OR 5/8" THICK, 4' WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAMETER OF OPENING IS 13–1/2 IN.
2. PIPE OR CONDUIT – NOM 12" DIAMETER (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE, NOM 12" DIAMETER (OR SMALLER) SERVICE WEIGHT (OR HEAVIER) CAST IRON SOIL PIPE, NOM 12" DIAMETER (OR SMALLER) CLASS 50 (OR HEAVIER) DUCTILE IRON PRESSURE PIPE, NOM 6" DIAMETER (OR SMALLER) STEEL CONDUIT, NOM 4" DIAMETER (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING, NOM 6" DIAMETER (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING OR NOM 1" DIAMETER (OR SMALLER) FLEXIBLE STEEL CONDUIT. WHEN COPPER PIPE IS USED, MAX F RATING OF FIRESTOP SYSTEM (ITEM 3) IS 2 H. STEEL PIPES OR CONDUITS LARGER THAN NOM 4" DIAMETER MAY ONLY BE USED IN WALLS CONSTRUCTED USING STEEL CHANNEL STUDS. A MAX OF ONE PIPE OR CONDUIT IS PERMITTED IN THE FIRESTOP SYSTEM. PIPE OR CONDUIT TO BE INSTALLED NEAR CENTER OF STUD CAVITY WIDTH AND TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.
3. FILL, VOID OR CAVITY MATERIAL* – CAULK – CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND WITH A MIN 1/4" DIAMETER BEAD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF THE WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAX PIPE OR CONDUIT DIAM. [IN.]	ANNULAR SPACE. [IN.]	F RATING. [HR.]	T RATING. [HR.]
1	0 TO 3/16	1 OR 2	0+, 1 OR 2
1	1/4 TO 1/2	3 OR 4	3 OR 4
4	0 TO 1/4	1 OR 2	0
4	0 TO 1–1/2#	1 OR 2	0
6	1/4 TO 1/2	3 OR 4	0
12	3/16 TO 3/8	1 OR 2	0

+WHEN COPPER PIPE IS USED, T RATING IS 0 H.
#0 TO 1–1/2" ANNULAR SPACE APPLIES ONLY WHEN TYPE CP–25 WB+ CAULK IS USED AND ONLY WHEN THE MIN THICKNESS OF THE GYPSUM WALLBOARD IS 5/8" FOR 1 HR. RATED WALLS AND 1–1/4" FOR 2 HR. RATED WALLS.

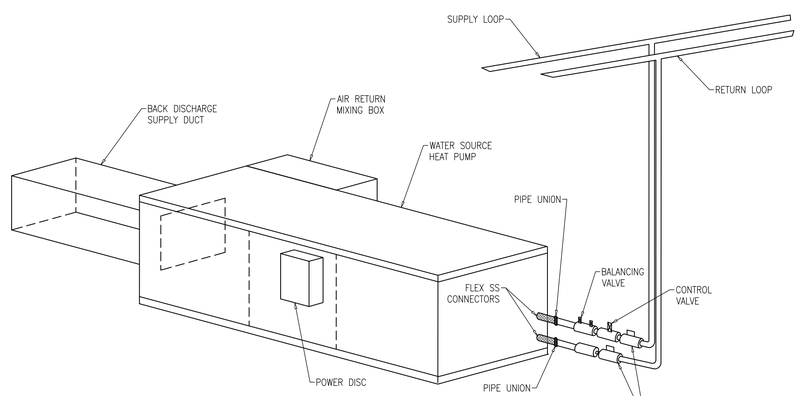
Minnesota Mining & Mfg. Co. – CP 25WB+.
*BEARING THE UL CLASSIFICATION MARKING

RATED WALL PENETRATION DETAIL
A / M0.1 NTS

WATER SOURCE HEAT PUMP EQUIPMENT SCHEDULE

	MBH	FT	GPM	EWT °F	–	CFM	IN WG	VOLTS	AMPS	MCOP (AMPS)	LOOP WATER FTP COPPER	–
CFM	COOLING/HEATING	PRESSURE DROP	FLOW RATE	COOLING/HEATING	EER/COP	SUPPLY AIR FAN	EXTERNAL STATIC	–	–	HCAR CB		
WSHP–40	28.5/33.3	7.6	7.5	86/68	13.2/4.4	1000	0.4	277V (265V)	11.9	20	3/4"	CARRIER / 50RHR006–030
WSHP–43	34.0/41.7	6.8	9.0	86/68	13.0/4.2	1200	0.5	277V (265V)	16.2	30	3/4"	CARRIER / 50RHR006–036
WSHP–46	28.5/33.3	7.6	7.5	86/68	13.2/4.4	1000	0.4	277V (265V)	11.9	20	3/4"	CARRIER / 50RHR006–030
WSHP–47	34.0/41.7	6.8	9.0	86/68	13.0/4.2	1200	0.5	277V (265V)	16.2	30	3/4"	CARRIER / 50RHR006–036
–	–	–	–	–	–	–	–	277V (265V)	–	–	–	–

1. PROVIDE SEVEN DAY PROGRAMMABLE THERMOSTAT. FIELD LOCATE IN OPTIMUM POSITION.
2. CONDENSING UNIT SHALL BE COMMISSIONED WITH THE HIGH HEAT OUTPUT OPTION SWITCH IN THE ON POSITION
3. PROVIDE LOW AMBIENT CONTROLS.
4. ROTE COND. DRAIN FROM CONDENSATE PUMP TO EXISTING CONDENSATE DRAIN FOR EXISTING WSHP.
5. PROVIDE FILTER HOLDER AND REPLACEABLE FILTER FOR EACH WSHP. PROVIDE 3 SPARE FILTERS FOR EACH UNIT
6. MATCH CONTROL PROVIDED FOR NEW WSHP TO EXISTING CONTROL FOR EXISTING HEAT PUMP. WHERE POSSIBLE UTILIZE THE RESPECTIVE CONTROL PANELS FOR THE RETIRED WSHP FOR THE NEW HEAT PUMP. COORDINATE WITH THE BUILDING CONTROLS CONTRACTOR
7. MANUFATURER'S CATALOG NUMBER PROVIDED AS BASIS OF DESIGN. MATCH EXISTING MANUFACTURER FOR FOR COMPATIBILITY WITH CONTROLS SPARES AND MAINTENANCE PROCEDURES.



WSHP SECHEMATIC DETAIL
C / M0.1 SCALE: NONE

NOTE
1. INTEGRAL HANGER SUPPORT WITH VIBRATION ISOLATOR FOR 3/8" ROD FACTORY ATTACHED.
2. AIR RETURN MIXING BOX WITH DAMPER PROVIDED BY THE CONTRACTOR
3. PROVIDE 120 VOLT CONTROL POWER FOR WSHP FROM 120 PANELBAORD AS REQUIRED

OUTSIDE AIR CALCULATION FOR REN0VATED AREAS

BASED ON ASHRAE STANDARD 62.1 – 2004/2007							EXHAUST AIR			
AREA	SF	OCCUP./ 1000 SF	No OF / OCCUP.	CFM /SQ.FT.	CFM/ OCCUP.	REQUIRED OA (CFM)	No. OF FIXT'S. /HOOD LENGTH	CFM/F OR CFM/FIXTURE	EXH. CFM REQUIRED	EXH. CFM PROVIDED
CLASS ROOMS	1738	N/A	52	0.06	7.5	494.3	–	–	–	–
STORAGE	368	N/A	0	0.06	0.0	22.8	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
					TOTAL	517.1			TOTAL	0.0
OUTSIDE AIR PROVIDED BY WHSP 40N						125.0	–			–
OUTSIDE AIR PROVIDED BY WHSP–46N						125.0	–			–
OUTSIDE AIR PROVIDED BY WHSP 43N						125.0	–			–
OUTSIDE AIR PROVIDED BY WHSP–47N						125.0	–			–
OUTSIDE AIR PROVIDED BY WHSP 44 (TO BE ADJUSTED)						??	–			–
OUTSIDE AIR PROVIDED BY WHSP–37 (TO BE ADJUSTED)						??	–			–
OUTSIDE AIR PROVIDED BY WHSP–48 (TO BE ADJUSTED)						??	PROVIDE OR ADJ. BAROMETRIC RELIEF FOR			0.0
TOTALS					TOTAL	520.0	TOTAL			0.0

NOTES. 2.

1. OFFICES CONVERTED TO STORAGE SPACES CAN HAVE THE OUTSIDE AIR SUPPLY REDUCED TO EXCLUDE THE OUTSIDE AIR REQUIRED PER PERSON IN THESE OFFICES

REVISIONS

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GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 017734 WINSTON D. RICHARDS
7/19/2018

MECHANICLA HVAC LEGEND SCHEDULE DETAILS AND NOTES

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS
2538 PANOLA RD | DECATUR, GA 30058

FOR CONSTRUCTION

BROWN DESIGN GROUP
ARCHITECTS – PLANNERS – INTERIOR DESIGNERS
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(c) 404–559–1805 (F) 404–76–0920 (E) TEEPHONE@BDGPROUP.COM

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DRAWN: ECSI
SCALE: AS NOTED
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JOB NO.: ECSI - 1806

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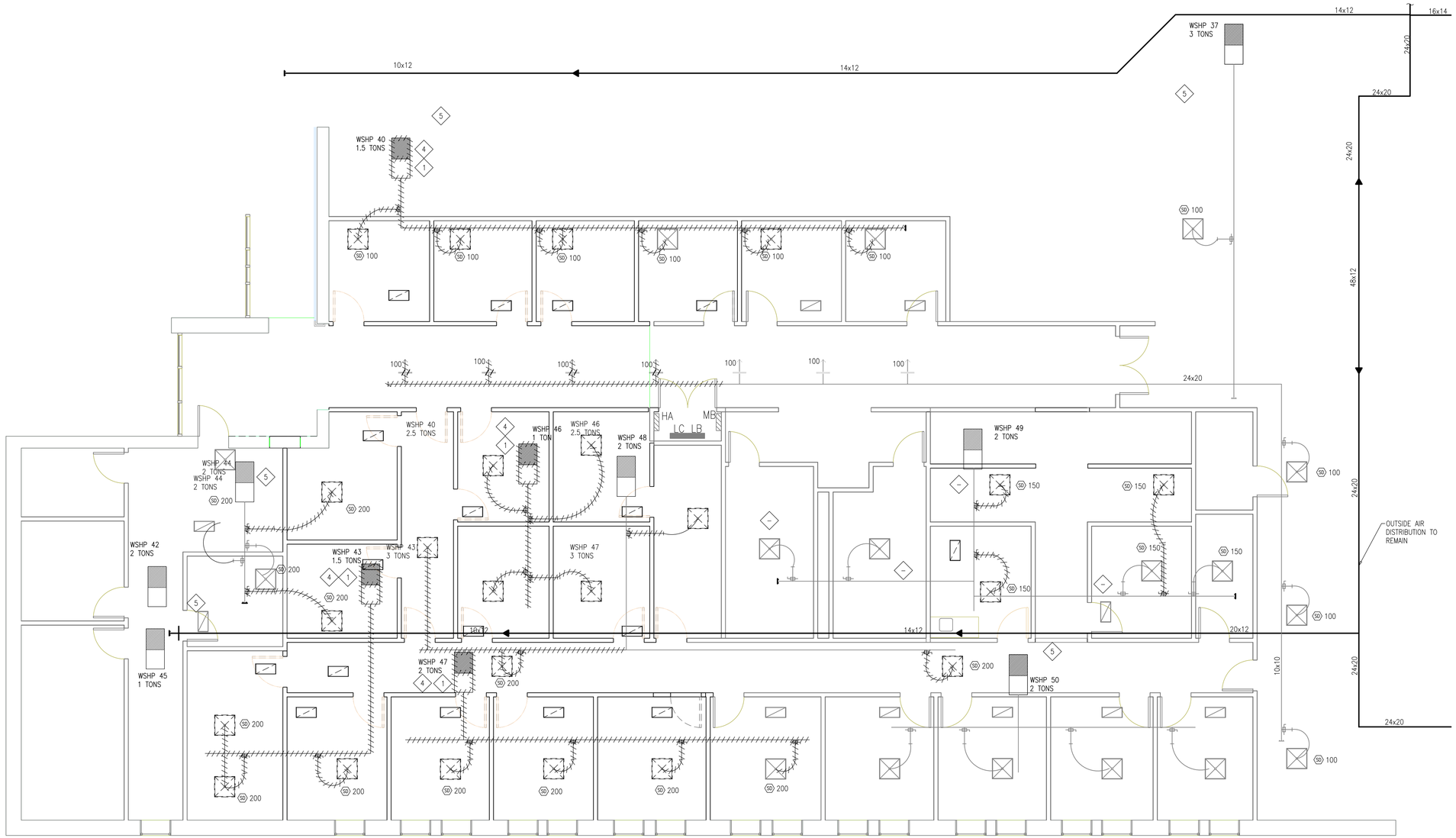


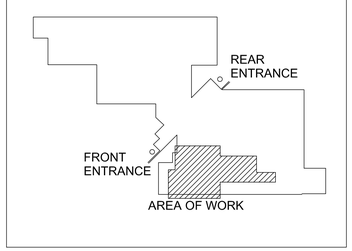
1 / M1.1 MECHANICAL HVAC DEMOLITION PLAN

SCALE 3/16" = 1'-0"

KEY DEMOLITION NOTES

1. EXISTING WATER SOURCE HEAT PUMPS (WSHP)L MECHANICAL AND PLUMBING CONNECTIONS TO REMAIN. COORDINATE WITH THE CONTROLS CONTRACTOR TO PRESERVE THE CONTROL WIRING.
2. EXISTING DUCT TO REMAIN. WHERE EXISTING AIR DISTRIBUTION DUCT IS PARTIALLY DEMOLISHED AND REMOVED SEAL ALL OPENINGS IN REMAINING DUCT AND MAKE PREPARATIONS FOR INSTALLATION OF NEW HVAC DUCT CONNECTING TO THE EXISTING HVAC DUCT.
3. EXISTING WSHP TO BE DISCONNECTED MECHANICALLY AND ELECTRICALLY REMOVED AND RETURNED TO THE OWNER. REMOVE WATER PIPE CONNECTION BACK THE MAIN WATER LINE.
4. WHERE EXISTING WSHP IS REMOVED, DEMOLISH THE EXISTING BRANCH OUTSIDE AIR DUCT BACK TO THE MAIN SUPPLY DUCT AND CAP. NOTE THAT ALL COORDINATE LOCATION OF CEILING DIFFUSERS, SUPPLY REGISTERS AND AIR RETURN GRILLS WITH THE ARCHITECTURAL DRAWINGS.
5. EXISTING OUTSIDE AIR DUCTS TO REMAIN NOTE THAT ALL WSHP ARE SUPPLIED WITH OA FROM A MAIN BRANCH DUCT. PROTECT AND PRESERVE THE EXISTING OA DUCTS CONNECTED TO EXISTING WSHP TO REMAIN IN SERVICE.
6. EXISTING HVAC AIR DISTRIBUTIONS SYSTEM MAY VARY FROM THAT SHOWN ON THE PLAN, OR THE AS-BUILT DRAWINGS. FIELD COORDINATE CHANGES REQUIRED TO ACCOMMODATE THE NEW DUCT WORK.
7. DEMOLISH PART OF THE HVAC DUCT AND SUPPLY GRILLES UNDER THE SKY LIGHT AS SHOWN AND CAP REMAINING DUCT.
8.

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

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MECHANICAL HVAC DEMOLITION PLAN
LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS
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JOB NO.:	ECSI - 1806

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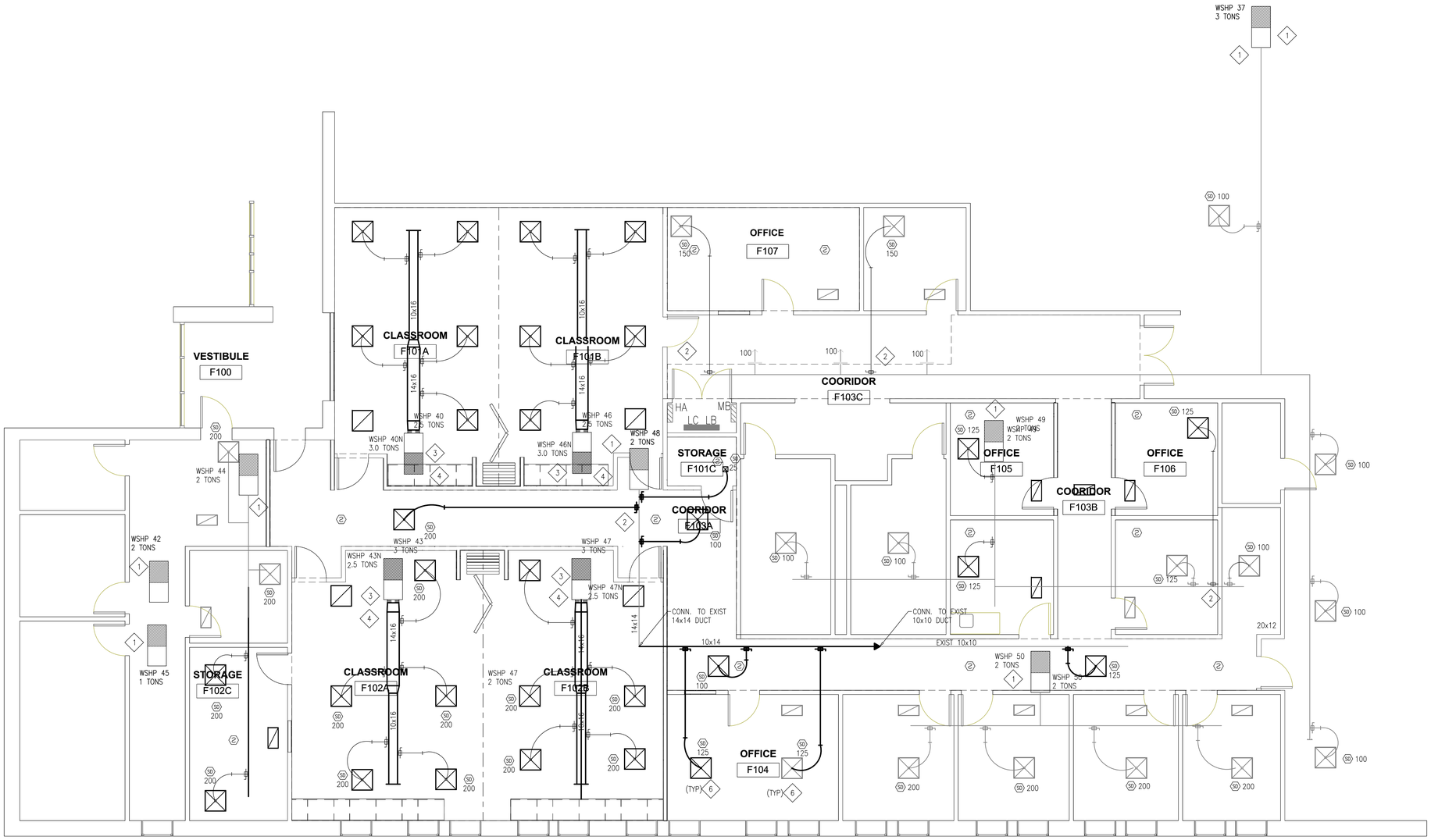


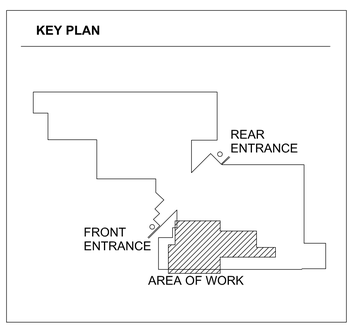
1 M1.2 MECHANICAL HVAC PLAN

SCALE 3/16" – 1'-0"

KEY DEMOLITION NOTES

1. EXISTING WATER SOURCE HEAT PUMPS (WSHP) ELECTRICAL MECHANICAL PLUMBING AND CONTROL CONNECTIONS TO REMAIN. COORDINATE WITH THE CONTROLS CONTRACTOR TO PRESERVE THE CONTROL WIRING.
2. EXISTING DUCT TO REMAIN. PROVIDE A SPIN IN FITTING FOR ALL RUN OUT TO THE CEILING DIFFUSER OR SUPPLY GRILLE.
3. THE NEW WATER SOURCE HEAT PUMP SHALL BE PROVIDED BY THE SAME MANUFACTURER AS THE AS THAT FOR THE EXISTING WSHP
4. NEW WSHP TO BE CONNECTED AS SHOWN. PROVIDE SUPPORT FOR THE NEW UNIT ATTACHED TO THE BUILDING STRUCTURE. PROVIDE CONTROLS FOR THE NEW WSHP TO MATCH CONTROLS FOR THE EXISTING SYSTEM. WHERE POSSIBLE CONTROLS FOR EXISTING WSHP THAT HAVE BEEN REMOVED FROM SERVICE CAN BE REUSED FOR THE NEW WSHP. COORDINATE WITH THE EQUIPMENT MANUFACTURER
5. WHERE EXISTING WSHP IS REMOVED, DEMOLISH THE EXISTING BRANCH OUTSIDE AIR DUCT BACK THO THE MAIN SUPLY DUCT AND CAP. NOTE THAT ALL COORDINATE LOCATION OF CEILING DIFFUSERS, SUPPLY REGISTERS AND AIR RETURN GRILLS WITH THE ARCHITECTURAL DRAWINGS.
6. MAKE ADJUSTMENTS TO EXISTING AIR FLOWS FOR EXISTING WATER SOURCE HEAT PUMPS AT EXISTING AND NEW SUPPLY DIFFUSERS TO COMPLY WITH THAT SHOWN ON THE PLANS.

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

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7/19/2018

MECHANICAL HVAC PLAN AND NOTES

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

2538 PANOLA RD | DECATUR, GA 30058

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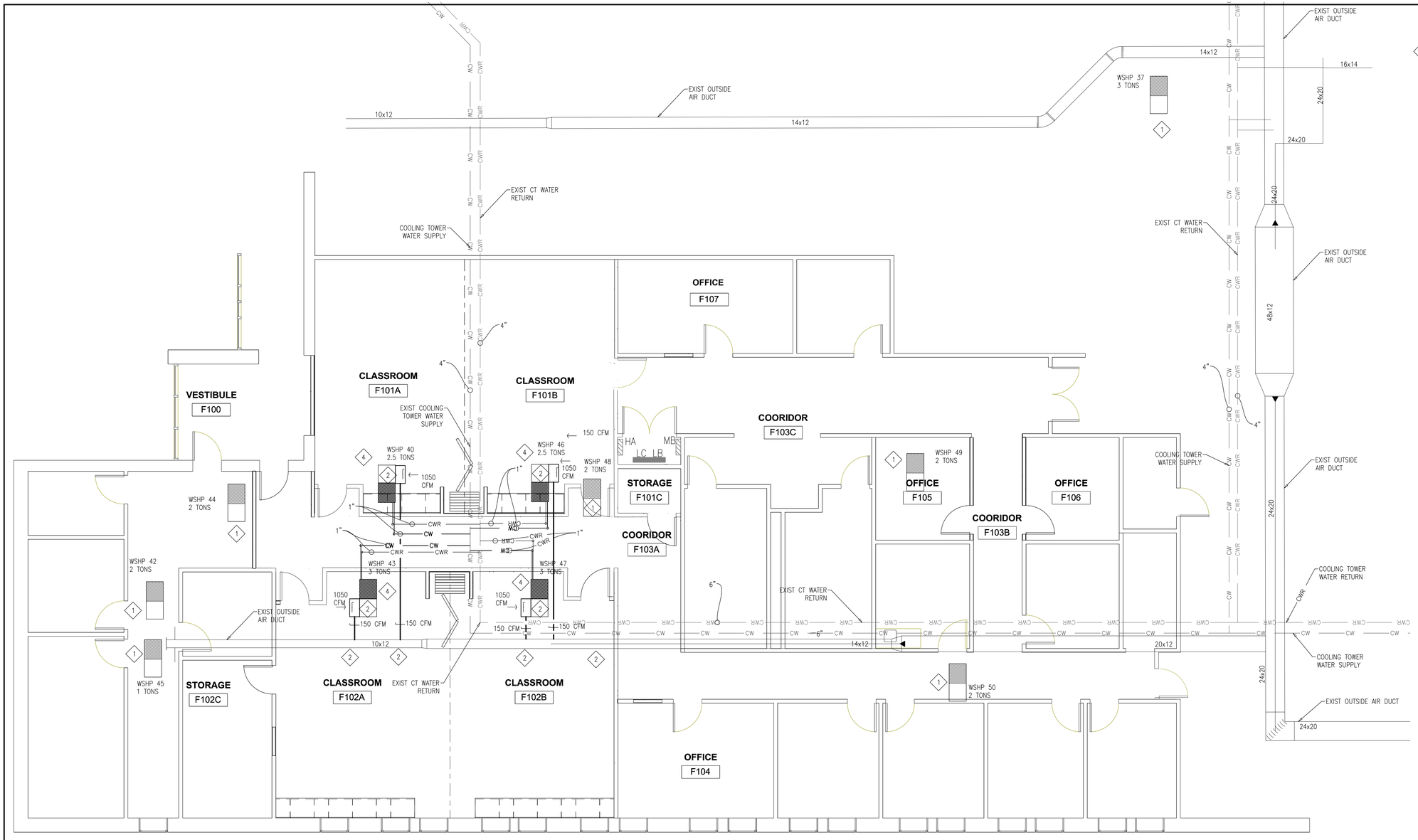
M1.2



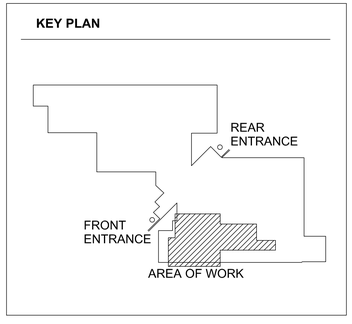
1 M1.3 MECHANICAL HVAC PIPING & OUTSIDE AIR SUPPLY PLAN

SCALE 3/16" – 1'-0"

KEY DEMOLITION NOTES

1. EXISTING WATER SOURCE HEAT PUMPS (WSHP) ELECTRICAL, MECHANICAL, PLUMBING AND CONTROL CONNECTIONS TO REMAIN. COORDINATE WITH THE CONTROLS CONTRACTOR TO PRESERVE THE CONTROL WIRING.
2. EXISTING OUTSIDE AIR DUCT TO REMAIN. PROVIDE A SPIN IN FITTING FOR ALL NEW RUN OUT TO THE NEW WATER SOURCE HEAT PUMPS. PROVIDE MIXING BOX WITH RETURN AIR DAMPER FOR CONNECTION OF OUTSIDE AIR DUCT
3. THE NEW WATER SOURCE HEAT PUMP SHALL BE PRODUCED BY THE SAME MANUFACTURER AS THE AS THAT FOR THE EXISTING WSHP
4. PROVIDE SUPPORT FOR THE NEW WSHP ATTACHED TO THE BUILDING STRUCTURE. PROVIDE CONTROLS FOR THE NEW WSHP TO MATCH CONTROLS FOR THE EXISTING SYSTEM. WHERE POSSIBLE CONTROLS FOR EXISTING WSHP THAT HAVE BEEN REMOVED FROM SERVICE CAN BE REUSED FOR THE NEW WSHP. COORDINATE WITH THE EQUIPMENT MANUFACTURER
5. WHERE EXISTING WSHP IS REMOVED, DEMOLISH THE EXISTING BRANCH OUTSIDE AIR DUCT BACK TO THE MAIN SUPPLY DUCT AND CAP. NOTE THAT ALL COORDINATE LOCATION OF CEILING DIFFUSERS, SUPPLY REGISTERS AND AIR RETURN GRILLS WITH THE ARCHITECTURAL DRAWINGS.
6. PROVIDE OUTSIDE AIR DUCT FROM MAIN OUTSIDE AIR SUPPLY DUCT TO THE NEW WSHP.

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

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GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 017734 WINSTON D. RICHARDS

7/19/2018

MECHANICAL HVAC PIPING & OUTSIDE AIR DUCT PLAN & NOTES

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

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LEGEND

POWER SYMBOL

- CIRCUIT HOMERUN, DESTINATION AS SHOWN ON THE PLAN
- CONDUIT AND WIRE, CROSSHATCH INDICATE #12 AWG CONDUCTORS, UNMARKED CONDUIT CONTAIN 2–#12 CONDUCTORS. INCLUDE A GREEN #12 CONDUCTOR IN EACH CONDUIT. CONDUCTOR SIZES OTHER THAN #12 AS INDICATED ON PLANS.
- CONDUIT CONCEALED ABOVE CEILING OR IN WALL
- CONDUIT CONCEALED IN CONCRETE SLAB, IN FLOOR OR UNDER GROUND 24" BELOW FINISHED GRADE
- DEDICATED RECEPTACLE OUTLET MOUNTED 18" AFF UNLESS NOTED OTHERWISE
- DUPLEX RECEPTACLE OUTLET MOUNTED 18" ABOVE FINISHED FLOOR.
- GFI DUPLEX RECEPTACLE OUTLET MOUNT AT COUNTERTOP HEIGHT OR AS INDICATED
- WP GFCI DUPLEX RECEPTACLE OUTLET MOUNTED 18" ABOVE FINISHED FLOOR. "WP" INDICATES WEATHERPROOF
- DOUBLE DUPLEX RECEPTACLE MOUNTED 18" ABOVE FINISHED FLOOR
- GFCI DOUBLE DUPLEX RECEPTACLE OUTLET, MOUNT AT COUNTER TOP OR AS NOTED
- GFCI DOUBLE DUPLEX RECEPTACLE OUTLET MOUNTED 18" ABOVE FINISHED FLOOR
- GFCI DUPLEX RECEPTACLE STUBBED UP 18" ABOVE FINISHED FLOOR. PROVIDE ADDITIONAL SUPPORT AS REQUIRED
- 220V, 3PH 4 WIRE RECEPTACLE OUTLET. PROVIDE MALE PLUG AND MATCH VOLTAGE & AMPERE RATING
- 220V, 1PH 3 WIRE RECEPTACLE OUTLET. PROVIDE MALE PLUG AND MATCH VOLTAGE & AMPERE RATING
- TV COMBINATION POWER AND CABLE OUTLET. FIELD COORDINATE MOUNTING HEIGHT
- F FUSED DISCONNECT SWITCH240V–3P/30A/NE–1 UNLESS NOTED OTHERWISE, ENCLOSURE NE–3R OUTDOOR OR AS OTHERWISE NOTED
- NON–FUSED DISCONNECT SWITCH 240V–3PH/30A/NE–1, ENCLOSURE NE–3R OUTDOOR OR AS OTHERWISE NOTED
- MOTOR STARTER WITH ON/OFF PUSH BUTTONS 208V–3PH/SIZE–0/NE–1, OR AS NOTED, OUTDOOR ENCLOSURE NE–3R, OR NE–4S
- M MOTOR RATED SWITCH 277V–2P/15A/NE–1. OUTDOOR ENCLOSURE NE–3R OR AS OTHERWISE NOTED
- 480/277V BRANCH CIRCUIT PANELBOARD. SEE PANELBOARD SCHEDULE FOR DETAILS
- 208/120V BRANCH CIRCUIT PANELBOARD SEE PANELBOARD SCHEDULE FOR DETAILS
- WALL MOUNTED JUNCTION BOX, SIZE AND ACCESS AS REQUIRED BY THE NATIONAL ELECTRIC CODE
- CEILING MOUNTED JUNCTION BOX, SIZE AND ACCESS AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
- PS PHOTO ELECTRIC SWITCH 240/120V 1000 WATT UNLESS NOTED OTHERWISE
- $O FLUSH OR SURFACE MOUNTED 20A 277V SINGLE POLE TOGGLE SWITCH.
- $3M FLUSH OR SURFACE MOUNTED 20A, 277V, 2–WAY TOGGLE SWITCH
- $4M FLUSH OR SURFACE MOUNTED 20A, 277V, 3–WAY TOGGLE SWITCH
- $IR SONIC INFRARED ON–OFF OCCUPANCY SENSOR, EMSN–OSSIR–IDT OCCUPANCY SENSOR, COORDINATE COLOR WITH ARCHITECT
- $P FLUSH OR SURFACE MOUNTED 20A 277V, SINGLE POLE PILOT LIGHT TOGGLE SWITCH
- $D FLUSH OR SURFACE MOUNTED DIMMER SWITCH 600WATT, 120V OR AS OTHERWISE NOTED.
- $OS PASSIVE INFRARED WALL SWITCH –OSSNL–10W & OSSNL–IDT OCCUPANCY SENSOR. COORDINATE COLOR WITH ARCHITECT

COMMUNICATION SYSTEM SYMBOLS

- FLOOR MOUNTED HIGH SPEED DATA/TELEPHONE OUTLET WITH 2 CAT 5 CABLE HOME RUN BACK TO TELE–TERMINAL BOARD
- HIGH SPEED DATA/TELEPHONE OUTLET WITH 2 CAT 5 CABLE HOME RUN BACK TO TELE–TERMINAL BOARD
- TELEPHONE OUTLET MOUNTED 18" AFF WITH CONDUIT UP TO ACCESSIBLE CEILING & CAT 5 CABLE HOME RUN BACK TO TELE–TERMINAL BOARD
- 48" X 48" X 3/4" TELEPHONE TERMINAL BOARD WITH DEDICATED RECEPTACLE AND TERMINAL BLOCKS FOR DATA AND TELEPHONE CABLE
- CONDUIT CONCEALED ABOVE CEILING FOR COMMUNICATION SYSTEM, T = TELEPHONE, D = DATA AND A = PUBLIC ADDRESS SYSTEM
- S SPEAKER, "IC" FOR INTER–COM, "FA" FOR FIRE ALARM
- SECURITY CAMERA
- DOOR ACCESS PAD
- IS INTERCOM SPEAKER SYSTEM

LIGHTING SYMBOLS

- H WALL MOUNTED EMERGENCY LIGHTING FIXTURE WITH INTEGRAL BATTERY AND CHARGER. SEE LIGHTING FIXTURE SCHEDULE
- A WALL MOUNTED INCANDESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE
- A 2' X 4' RECESSED FLUORESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE
- A 2' X 4' FLUORESCENT LIGHT FIXTURE WITH INTEGRAL EMERGENCY BALLAST. SEE LIGHTING FIXTURE SCHEDULE
- A 2' X 4' UN–SWITCHED NIGHT FLUORESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 2' X 2' RECESSED FLUORESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 2' X 2' FLUORESCENT LIGHT FIXTURE WITH INTEGRAL EMERGENCY BALLAST
- A 1' X 4' PENDANT MOUNTED FLUORESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 1' X 4' FLUORESCENT LIGHT FIXTURE WITH INTEGRAL EMERGENCY BALLAST. SEE LIGHTING FIXTURE SCHEDULE
- A 1' X 4' PENDANT MOUNTED UN–SWITCHED FLUORESCENT NIGHT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 1' X 4' FLUORESCENT LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 1' X 4' UN–SWITCHED FLUORESCENT NIGHT LIGHT FIXTURE
- A 1' X 4' SURFACE OR PENDANT MOUNTED FLUORESCENT STRIP LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A 1' X 4' SURFACE OR PENDANT MOUNTED FLUORESCENT STRIP LIGHT FIXTURE WITH INTEGRAL EMERGENCY BATTERY PACK. SEE LIGHTING FIXTURE SCHEDULE.
- A 1' X 4' SURFACE OR PENDANT MOUNTED UN–SWITCHED FLUORESCENT STRIP LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A RECESSED OR FLUORESCENT DOWN LIGHT FIXTURE. SEE LIGHTING FIXTURE SCHEDULE.
- A PENDANT MOUNTED LIGHT FIXTURE WITH INTEGRAL EMERGENCY BALLAST. SEE LIGHTING FIXTURE SCHEDULE.
- A EE EXIT / EMERGENCY LIGHT FIXTURE UNIVERSAL MOUNTING, RED LETTERS ON WHITE BACKGROUND AND INTEGRAL BATTERY PACK. SEE LIGHTING FIXTURE SCHEDULE
- E UNI–DIRECTIONAL EXIT LIGHT FIXTURE, UNIVERSAL MOUNTING, RED LETTERS ON WHITE BACKGROUND AND INTEGRAL BATTERY PACK. SEE LIGHT FIXTURE SCHEDULE
- E BI–DIRECTIONAL EXIT LIGHT FIXTURE,, UNIVERSAL MOUNTING WITH RED LETTERS ON WHITE BACKGROUND AND INTEGRAL BATTERY PACK. SEE LIGHTING FIXTURE SCHEDULE
- OS PASSIVE INFRARED MOTION DETECTORM, ACUITY SENSOR CM PDT 10 OR EQUAL. COORDINATE COLOR WITH ARCHITECT

FIRE ALARM SYSTEM SYMBOLS

- FACP FIRE ALARM CONTROL PANEL WITH BATERY PACK AND CHARGER AS REQUIRED BY NFPA 72
- FAAP FIRE ALARM ANNUNCIATOR PANEL CONNECT TO THE FIRE ALARM PANEL
- F FIRE ALARM HORN STROBE DEVICE. HORN dB AND STROBE CANDELA TO MEET NFPA 72
- F FIRE ALARM AUDIO DEVICE WITH dB RATING TO MEET NFPA 72
- F fIRE ALARM VOICE VISUAL DEVICE WITH PRE–RECORDED MESSAGE AS PER NFPA 72
- F FIRE ALARM BEAM SMOKE DETECTOR.
- D FIRE ALARM DUCT SMOKE DETECTOR COORD WITH MECHANICAL DIVISION
- H FIRE ALARM RAPID RISE HEAT DETECTOR
- D FIRE ALARM PHOTO ELECTRIC SMOKE DETECTOR
- D fIRE ALARM SMOKE DETECTOR FOR ELEVATOR RECALL
- F FIRE ALARM STROBE DEVICE CANDELA RATING AS PER NFPA 72
- F FIRE ALARM DOOR HOLD OPEN DEVICE WITH ADDITIONAL SMOKE DETECTORS AS CODE REQUIRES
- F FIRE ALARM DOOR HOLD OPEN DEVICE WITH ADDITIONAL SMOKE DETECTORS AS PER NFPA 72
- F FIRE ALARM PULL STATION
- TS FIRE PROTECTION TAMPER SWITCH MONITORED BY FIRE ALARM PANEL
- FS FIRE PROTECTION FLOW SWITCH MONITORED BY THE FIRE ALARM PANEL

GENERAL NOTES

1. PROVIDE LICENSED ELECTRICIANS WITH ADEQUATE SUPERVISION TO INSTALL AND COMPLETE THE WORK REQUIRED ON THE DRAWINGS AND SPECIFICATIONS. COORDINATE THE WORK OF THIS SECTION WITH OTHER TRADES NOTING THAT THE ELECTRICAL INSTALLATION IS AN INTEGRAL PART OF THE PROJECT.
2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE FOLLOWING CODE REQUIREMENTS:

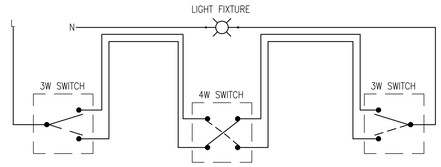
   INTERNATIONAL ELECTRIC CODE (NEC) 2017 EDITION WITH GEORGIA STATE AMENDMENTS.

   INTERNATIONAL BUILDING CODE (IBC) 2012 EDITION WITH GEORGIA STATE AMENDMENTS (2014)(2015)

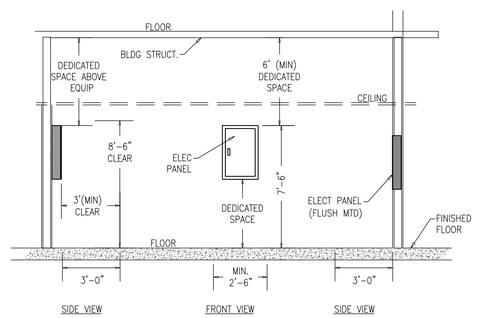
   INTERNATIONAL FIRE CODE (IFC) 2012 EDITION WITH GEORGIA STATE AMENDMENTS (2014)

   INTERNATIONAL ENERGY CODE (IEC) 2009 EDITION WITH GEORGIA STATE SUPPLEMENTS AND AMENDMENTS (2011)(2012)

   2012 NFPA 101 LIFE SAFETY CODE WITH STATE AMENDMENTS (2013)
3. THE CONTRACTOR SHALL OBTAIN ALL THE REQUIRED PERMITS FOR CONSTRUCTION. PAY ALL FEES AND OBTAIN ALL THE REQUIRED INSPECTIONS IN PROVIDING THE OWNER WITH A COMPLETE ELECTRICAL SYSTEM, READY FOR CERTIFICATE OF OCCUPANCY.
4. THE CONTRACTOR SHALL COORDINATE THE WORK WITH ALL TRADES AT ALL STAGES OF CONSTRUCTION, COORDINATE THE LOCATION OF DEVICES TO AVOID CONFLICTS AND TO ENSURE COMPLIANCE WITH THE CODES
5. THE MANUFACTURER'S CATALOG NUMBER IN THE LIGHTING FIXTURE SCHEDULE IS GIVEN AS THE BASIS OF DESIGN FOR THE LIGHTING. ALTERNATE SHALL BE EQUAL IN GRADE, PERFORMANCE AND PHOTO METRICS. DETAILS FOR COMPARING ALTERNATES SHALL BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER. COORDINATE THE VOLTAGE REQUIRED FOR THE LIGHT FIXTURE WITH THE LIGHTING PLANS PRIOR TO MAKING A BID
6. A LICENSED FIRE ALARM CONTRACTOR SHALL DESIGN AND PROVIDE A COMPLETE FIRE ALARM SYSTEM TO MEET THE REQUIREMENTS FOR STATE FEDERAL AND LOCAL CODES. PROVIDE ALL DEVICES REQUIRED WHETHER OR NOT THESE DEVICES AND COMPONENTS ARE SHOWN ON THE THE FLOOR PLANS OR THE RISER DIAGRAM. AS REQUIRED PROVIDE INTERFACE FOR THE HOOD CONTROL PANEL AND THE HVAC DUCT SMOKE DETECTORS WITH THE FIRE ALARM PANEL. THE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 72 AND NFPA 96.
7. THE CONTRACTOR CAN COMBINE HOME RUNS FOR CIRCUITS IN A SINGLE RACEWAY WITH A COMMON NEUTRAL. NO MORE THAN 3 CIRCUITS EQUIVALENT TO A 3 PHASE 4 WIRE CIRCUIT SHALL BE ACCEPTABLE IN A SINGLE RACEWAY. EACH SINGLE PHASE LIGHT AND RECEPTACLE CIRCUIT SHALL BE PROVIDED WITH ITS OWN NEUTRAL CONDUCTOR BACK TO THE PANELBOARD.
8. PROVIDE INTERLOCK CIRCUITS FOR A/C SYSTEMS AND AIR SUPPLY FANS TO SHUT OFF WHEN THE FIRE ALARM SYSTEM IS OTHER WISE ACTIVATED.
9. THE CONTRACTOR SHALL PROVIDE ALL CONNECTIONS FOR EQUIPMENT SUPPLIED BY OTHER DIVISIONS INCLUDING ARCHITECTURAL DIVISIONS ON THE PROJECT.



B E#.# 3 WAY & 4 WAY SCHEMATIC WIRING DIAGRAM
NTS



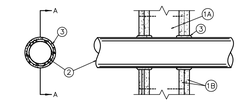
A E#.# ELECTRICAL PANELBOARD CLEARANCE DETAIL
NTS

NOTE
NO WATER, DRAIN OR GAS PIPES SHALL BE ROUTED THROUGH OR ABOVE AN ELECTRICAL ROOM OR ABOVE ELECTRICAL EQUIPMENT. NO DUCTS OR LEAK PROTECTION APPARATUS SHALL BE LOCATED IN THE DEDICATED SPACE

LIGHTING FIXTURE SCHEDULE

TYPE FIXTURE	DESCRIPTION	MFR/CAT. NO.	LAMPS	WATTS	REMARKS
A	OPEN 2'X4' STATIC LED RECESSED GRID TROFFER WITH ACRYLIC RELECTOR	COLUMBIA/ LCAT24–35–ML–G–C–E–U (EL14) ALT. LITHONIA OR DAYBRITE	LED – –	1–52W – –	PROVIDE EMERGENCY BALLAST WHERE INDICATED
B	OPEN 2'X2' STATIC LED RECESSED TROFFER FIXTURE WITH ACRYLIC REFLECTOR	COLUMBIA/ LCAT22–35–ML–G––E–U (EL14) ALT. LITHONIA OR DAYBRITE	LED – –	1–30W – –	PROVIDE EMEGENCY BALLAST WHERE INDICATED
C	PENDANT OR SURFACE MTD LED STRIP LIGHT FIXTURE	COLUMBIA/ LCS 4–35–ML–E–U (EL14) ALT. LITHONIA OR DAYBRITE	LED – –	1–48W – –	NOT USED – –
D	6" OPEN FLUORESCENT RECESSED LED DOWN LIGHT WITH SELF TRIM CLEAR ALZAK RELECTOR DIECAST ALUMINIUM SOCKET HEAT SINK.	PRESCOLITE/ LC6HL–6LCH45L–30K–8–WH–WT–B6 ALT. COLUMBIA OR LIGHTOLIER	LED – –	1–52W – –	NOT USED – –
EE	SELF CONTAINED EMERGENCY L.E.D. EXIT LIGHT WITH BATTERY PACK AND CHARGER	DUAL LITE EE EVC–U–R–W ALT. LITHONIA–QUANTUM OR CHLORIDE	LED HALOGEN –	5W 2–7W –	CONNNECT TO THE UNSWITCHED CONDUCTOR OF CKT. MH – 7'–AFF.
F	– – –	– – –	– – –	– – –	– – –
H	EMERGENCY LIGHT FIXT. WITH SELF CONTAINED BATTERY PACK AND CHARGER	DUAL LITE/ EV–2––I––U	LED – –	2–1W – –	CONNNECT TO THE UNSWITCHED CONDUCTOR OF CKT. MH – 7'–AFF.

F RATINGS – 1, 2, 3 AND 4 HR (SEE ITEMS 2 AND 3)
T RATINGS – 0, 1, 2, 3 AND 4 HR (SEE ITEM 3)
L RATING AT AMBIENT – LESS THAN 1 cfm/sq ft
L RATING AT 400 F – LESS THAN 1 cfm/sq ft



METAL PIPE PENETRATION THRU RATED WALL UL SYSTEM # W-L-1001

N.T.S.

1. WALL ASSEMBLY – THE 1, 2, 3 OR 4 HR FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
   A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS (MAX 2 H FIRE RATED ASSEMBLIES) OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC WITH NOM 2 BY 4 IN. LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3–5/8" WIDE BY 1–3/8" DEEP CHANNELS SPACED MAX 24 IN. OC.
   B. WALLBOARD, GYPSUM* – NOM 1/2" OR 5/8" THICK, 4' WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAMETER OF OPENING IS 13–1/2 IN.
2. PIPE OR CONDUIT – NOM 12" DIAMETER (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE, NOM 12" DIAMETER (OR SMALLER) SERVICE WEIGHT (OR HEAVIER) CAST IRON SOIL PIPE, NOM 12" DIAMETER (OR SMALLER) CLASS 50 (OR HEAVIER) DUCTILE IRON PRESSURE PIPE, NOM 6" DIAMETER (OR SMALLER) STEEL CONDUIT, NOM 4" DIAMETER (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING, NOM 6" DIAMETER (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING OR NOM 1" DIAMETER (OR SMALLER) FLEXIBLE STEEL CONDUIT. WHEN COPPER PIPE IS USED, MAX F RATING OF FIRE–STOP SYSTEM (ITEM 3) IS 2 H. STEEL PIPES OR CONDUITS LARGER THAN NOM 4" DIAMETER MAY ONLY BE USED IN WALLS CONSTRUCTED USING STEEL CHANNEL STUDS. A MAX OF ONE PIPE OR CONDUIT IS PERMITTED IN THE FIRE–STOP SYSTEM. PIPE OR CONDUIT TO BE INSTALLED NEAR CENTER OF STUD CAVITY WIDTH AND TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.
3. FILL, VOID OR CAVITY MATERIAL* – CAULK – CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND WITH A MIN 1/4" DIAMETER BEAD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF THE WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAX PIPE OR CONDUIT DIAM. [IN.]	ANNULAR SPACE. [IN.]	F RATING. [HR.]	T RATING. [HR.]
1	0 TO 3/16	1 OR 2	0+, 1 OR 2
1	1/4 TO 1/2	3 OR 4	3 OR 4
4	0 TO 1/4	1 OR 2	0
4	0 TO 1–1/2#	1 OR 2	0
6	1/4 TO 1/2	3 OR 4	0
12	3/16 TO 3/8	1 OR 2	0

+WHEN COPPER PIPE IS USED, T RATING IS 0 H.
#0 TO 1–1/2" ANNULAR SPACE APPLIES ONLY WHEN TYPE CP–25 WB+ CAULK IS USED AND ONLY WHEN THE MIN THICKNESS OF THE GYPSUM WALLBOARD IS 5/8" FOR 1 HR. RATED WALLS AND 1–1/4" FOR 2 HR. RATED WALLS.

Minnesota Mining & Mfg. Co. – CP 25WB+.
*BEARING THE UL CLASSIFICATION MARKING

– E#.# RATED WALL PENETRATION DETAIL
NTS

PANELBOARD SCHEDULE

PANEL: MB EXIST
VOLTAGE: 480/277V
SIZE: 225A
100% NEUTRAL: YES
LOCATION: ELECT CLOSET
PHASE: 3
MAIN: MLO
MOUNTING: SURFACE
ENCL: NE–1
WIRE: 4
AIC: 10 KA
GROUND BUS: Y
ISOLATED GROUND BUS: NO

CKT. NO.	AMPS TRIP	P	CIRCUIT DESCRIPTION	KVA	"A"	PHASE "B"	"C"	KVA	CIRCUIT DESCRIPTION	P	AMPS TRIP	CKT. NO.
1	20	1	WSHP–40	–	–			–	WSHP–52	3	20	2
3	20	1	WSHP–41	–		–		–	–	–	–	4
5	20	1	WSHP–39	–			–	–	–	–	–	6
7	20	1	WSHP–48	–	–			–	CEILING HEATER	1	20	8
9	30	1	WSHP–47	–		–		–	SPARE	1	20	10
11	20	1	WSHP–46	–			–	–	SPARE	1	20	12
13	30	1	WSHP–43	–	–			–	–	1	20	14
15	20	1	WSHP–44	–		–		–	–	1	20	16
17	20	1	WSHP–42	–			–	–	–	1	20	18
19	20	1	WSHP–45	–	–			–	–	1	20	20
21	20	1	WSHP–49	–		–		–	–	1	20	22
23	20	1	WSHP–50	–			–	–	–	1	20	24
25	20	1	SPARE	–	–			–	–	1	20	26
27	20	1	SPARE	–		–		–	–	1	20	28
29	20	1	SPARE	–			–	–	–	1	20	30
31	20	1	–	–	–			–	–	1	20	32
33	20	1	–	–		–		–	–	1	20	34
35	20	1	–	–			–	–	–	1	20	36
37	20	1	–	–	–			–	–	1	20	38
39	20	1	–	–		–		–	–	1	20	40
41	20	1	–	–			–	–	–	1	20	42
			PHASE TOTALS:		–	–	–					
			PANEL TOTAL:			–		KVA				

PANELBOARD SCHEDULE

PANEL: HA EXIST
VOLTAGE: 481/277V
SIZE: 225A
100% NEUTRAL: YES
LOCATION: ELECT CLOSET
PHASE: 3
MAIN: MLO
MOUNTING: SURFACE
ENCL: NE–1
WIRE: 4
AIC: 10 KA
GROUND BUS: Y
ISOLATED GROUND BUS: NO

CKT. NO.	AMPS TRIP	P	CIRCUIT DESCRIPTION	KVA	"A"	PHASE "B"	"C"	KVA	CIRCUIT DESCRIPTION	P	AMPS TRIP	CKT. NO.
1	20	1	LTG CLASS ROOM	1.2	–			–	LTG – OFFICES	1	20	2
3	20	1	LTG CLASS ROOM	1.0		–		–	LTG – CONF, OFFICES	1	20	4
5	20	1	SPARE	–			–	–	LTG – RESTRMS, CORR	1	20	6
7	20	1	SPARE	–	–			–	LTG – KITCH, SERVING	1	20	8
9	20	1	SPARE	–		–		–	LTG – CORR,CATER,GRN RM	1	20	10
11	20	1	SPARE	–			–	–	LTG – OFFS,RESTRMS,SALON	1	20	12
13	20	1	SPARE	–	–			–	LTG – LOBBY, RESTRMS	1	20	14
15	20	1	LTG – EXT RECESS (REAR)	–		–		–	SPARE	1	20	16
17	20	1	LTG – CANOPY (FRONT)	–			–	–	SPARE	1	20	18
19	20	1	LTG – EXT WELL LTS	–	–			–	SPARE	1	20	20
21	20	1	LTG – EXT WELL LTS	–		–		–	SPARE	1	20	22
23	20	1	LTG – GALLERY CEILING	–			–	–	SPARE	1	20	24
25	20	1	–	–	–			–	SPARE	1	20	26
27	20	1	–	–		–		–	–	1	20	28
29	20	1	–	–			–	–	–	1	20	30
31	20	1	–	–	–			–	–	1	20	32
33	20	1	–	–		–		–	–	1	20	34
35	20	1	–	–			–	–	–	1	20	36
37	20	1	–	–	–			–	–	1	20	38
39	20	1	–	–		–		–	–	1	20	40
41	20	1	–	–			–	–	–	1	20	42
			PHASE TOTALS:		–	–	–					
			PANEL TOTAL:			–		KVA				

PANELBOARD SCHEDULE

PANEL: LB EXIST
VOLTAGE: 208/120V
SIZE: 225A
100% NEUTRAL: YES
LOCATION: ELECT CLOSET
PHASE: 3
MAIN: MLO
MOUNTING: SURFACE
ENCL: NE–1
WIRE: 4
AIC: 10 KA
GROUND BUS: Y
ISOLATED GROUND BUS: NO

CKT. NO.	AMPS TRIP	P	CIRCUIT DESCRIPTION	KVA	"A"	PHASE "B"	"C"	KVA	CIRCUIT DESCRIPTION	P	AMPS TRIP	CKT. NO.
1	20	1	RCPT – I & A VOC	–	–			–	RCPT – PLAN MG	1	20	2
3	20	1	RCPT – WORK ROOM	–		–		–	RCPT – I & A SPEC	1	20	4
5	20	1	RCPT – WORK ROOM	–			–	–	RCPT – FLT OFFICE	1	20	6
7	20	1	RCPT – WORK ROOM	–	–			–	RCPT CLASS RM	1	20	8
9	20	1	RCPT – WORK ROOM	–		–		–	RCPT – STAFF LOUNGE	1	20	10
11	20	1	RCPT – WORK ROOM	–			–	–	RCPT – STAFF LOUNGE	1	20	12
13	20	1	RCPT – CONF ROOM	–	–			–	RCPT CLASS RM	1	20	14
15	20	1	RCPT – EDF	–		–		–	RCPT CLASS RM	1	20	16
17	20	1	RCPT – EDF	–			–	–	RCPT CLASS RM	1	20	18
19	20	1	RCPT – TOILETS	–	–			–	RCPT – WAITING	1	20	20
21	20	1	–	–		–		–	RCPT – RECEPTIONIST	1	20	22
23	20	1	–	–			–	–	RCPT – NURSE STATION	1	20	24
25	20	1	RCPT – STAFF OFFICE	–	–			–	RCPT – EXAM	1	20	26
27	20	1	RM M110 (FIRE PWR PK)	–		–		–	RCPT – OFFICE	1	20	28
29	20	1	SPARE	–			–	–	RCPT – EXAM	1	20	30
31	20	1	SPARE	–	–			–	RCPT – TOILETS	1	20	32
33	20	1	SPARE	–		–		–	SPARE	1	20	34
35	20	1	HAND DRYERS	–			–	–	SPARE	1	20	36
37	20	1	HAND DRYERS	–	–			–	SPARE	1	20	38
39	20	1	HAND DRYERS	–		–		–	SPARE	1	20	40
41	20	1	HAND DRYERS	–			–	–	SPARE	1	20	42
			PHASE TOTALS:		–	–	–					
			PANEL TOTAL:			–		KVA				

PANELBOARD SCHEDULE

PANEL: LC EXIST
VOLTAGE: 208/120V
SIZE: 225A
100% NEUTRAL: YES
LOCATION: ELECT CLOSET
PHASE: 3
MAIN: MLO
MOUNTING: SURFACE
ENCL: NE–1
WIRE: 4
AIC: 10 KA
GROUND BUS: Y
ISOLATED GROUND BUS: NO

CKT. NO.	AMPS TRIP	P	CIRCUIT DESCRIPTION	KVA	"A"	PHASE "B"	"C"	KVA	CIRCUIT DESCRIPTION	P	AMPS TRIP	CKT. NO.
1	20	1	RCPT CLASS RM	–	–			–	RCPT –	1	20	2
3	20	1	RCPT CLASS RM	–		–		–	RCPT –	1	20	4
5	20	1	RCPT CLASS RM	–			–	–	RCPT –	1	20	6
7	20	1	RCPT CLASS RM	–	–			–	RCPT –	1	20	8
9	20	1	–	–		–		–	RCPT – EDF	1	20	10
11	20	1	–	–			–	–	RCPT – EDF	1	20	12
13	20	1	–	–	–			–	RCPT – EDF	1	20	14
15	20	1	RCPT – GIFT SHOP	–		–		–	RCPT – SALON	1	20	16
17	20	1	RCPT – GIFT SHOP	–			–	–	RCPT – SALON	1	20	18
19	20	1	RCPT – GIFT SHOP	–	–			–	RCPT – SALON	1	20	20
21	20	1	RCPT – TOILETS	–		–		–	RCPT – SALON	1	20	22
23	20	1	RCPT – FIRE PROTECT	–			–	–	RCPT – SALON	1	20	24
25	20	1	RCPT – FAC MGT	–	–			–	RCPT – SALON	1	20	26
27	20	1	–	–		–		–	ENTRY DOORS	1	20	28
29	20	1	–	–			–	–	RCPT – SALON	1	20	30
31	20	1	–	–	–			–	RCPT – SALON	1	20	32
33	20	1	FRONT SIGN	–		–		–	LTG – REAR COURT VALET	1	20	34
35	20	1	LTG – RECEPTION	–			–	–	LTG – REAR COURT VALET	1	20	36
37	20	1	LTG – GALLERY	–	–			–	SPARE	1	20	38
39	20	1	LTG – GALLERY	–		–		–	WATER HEATER SALON	1	20	40
41	20	1	LTG – GALLERY	–			–	–	WATER HEATER SALON	1

1 E1.1 ELECTRICAL DEMOLITION PLAN

SCALE 3/16" = 1'-0"

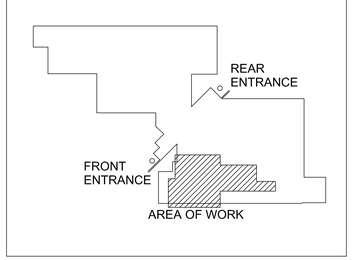
DEMOLITION KEY NOTES:

1. THE SENOR CENTER IS AN ACTIVE OCCUPIED FACILITY AND AS SUCH ALL WORK ON THE ELECTRICAL COMMUNICATION AND LIFE SAFETY SYSTEMS SHALL NOT IMPACT THE NORMAL OPERATION OF THE FACILITY.
2. ALL DEMOLITION SHALL BE COORDINATED WITH THE ARCHITECTURAL DEMOLITION. PRIOR TO DEMOLITION VERIFY AND UPDATE ALL PANELBOARD SCHEDULES FOR LIGHTING AND DEVICES IN THE AREA OF CONSTRUCTION.
3. EXISTING WIRING AND CONTROLS TO THE EXISTING WATER SOURCE HEAT PUMPS TO REMAIN. PROTECT AND PRESERVE WIRING DURING DEMOLITION.
4. EXISTING LIGHTING AND LIGHT SWITCH AND WIRING IN THE SPACE TO BE DEMOLISHED UNLESS NOTED OTHERWISE. IDENTIFY CIRCUIT PRIOR TO DEMOLITION REMOVE WIRE BACK TO THE NEAREST JUNCTION BOX. REMOVE WIRING TO EXISTING CIRCUIT IN AREAS IDENTIFIED FOR LIGHTING & POWER DEMOLITION. RESTORE POWER TO ALL PARTS OF CIRCUIT DISCONNECTED BY PARTIAL DEMOLITION.
5. EXISTING RECEPTACLES AND WIRING TO BE DEMOLISHED. EXISTING COMMUNICATION OUTLETS AND WIRING TO BE DEMOLISHED. REMOVE CONDUIT AND WIRE FOR POWER AND COMMUNICATION CIRCUITS BACK TO THE NEAREST JUNCTION BOX AND MAKE SAFE. TAG ALL CIRCUITS PROTECT AND PRESERVE FOR USE WITH THE NEW LAYOUT. RESTORE POWER AND COMMUNICATION CONNECTION TO ALL DEVICES DISCONNECTED BY PARTIAL DEMOLITION.
6. COORDINATE WITH THE FACILITIES COMMUNICATION CONTRACTOR TO REMOVE EXISTING CEILING MOUNTED WI-FY AND AND SECURITY DEVICES IN AREAS WHERE THE CEILING IS TO BE DEMOLISHED. CONVEY WITH RECORD ALL SUCH DEVICES REMOVED TO THE CONTRACTOR OR THE OWNERS REPRESENTATIVE.
7. PROVIDE TEMPORARY SUPPORT FOR DEVICES AND FIRE ALARM SYSTEM DEVICES IN PARTICULAR THAT WILL REMAIN IN SERVICE IN THE SPACE DURING CONSTRUCTION. COORDINATE WITH THE ARCHITECT TO MAINTAIN POWER TO ALL REQUIRED EXIT SIGNS AND EMERGENCY LIGHTING IN THE CONSTRUCTION AREA.
8. EXISTING WSHP TO BE REMOVED AND RETURNED TO THE OWNER. PRESSURE CONTROL WIRING AND POWER WIRING FOR REUSE WITH THE NEW WSHP's. COORDINATE WITH THE BUILDING CONTROLS CONTRACTOR. COORDINATE WITH MECHANICAL CONTRACTOR.
9. EXISTING OCCUPANCY SENSOR SWITCHES TO BE REMOVED.
10. DEMOLISH EXISTING EMERGENCY LIGHTS AND WIRING IN CONSTRUCTION AREA CONNECTED TO CIRCUIT HA-38, RESTORE POWER TO ALL PARTS OF CIRCUIT DISCONNECTED BY PARTIAL DEMOLITION.
11. EXISTING LIGHTING, POWER, FIRE ALARM AND COMMUNICATIONS WIRING TO REMAIN. RESTORE POWER & CONTINUITY TO ALL CIRCUITS & WIRING DISCONNECTED BY PARTIAL DEMOLITION.

DEMOLITION LEGEND

EX	EXISTING 2' X 4' RECESSED LIGHT FIXTURE TO REMAIN
AX	EXISTING 2' X 4' RECESSED LIGHT FIXTURE TO BE DEMOLISHED
BX	EXISTING 2' X 2' RECESSED LIGHT FIXTURE TO BE DEMOLISHED
EX	2' X 2' RECESSED FLUORESCENT LIGHT FIXTURE. TO REMAIN
$M	EXISTING MOTOR RATED DISCONNECT TO REMAIN
$o	FLUSH OR SURFACE MOUNTED 20A 277V SINGLE POLE TOGGLE SWITCH.
$OS	OCCUPANCY SENSOR SWITCH TO BE DEMOLISHED OR REMAIN AS NOTED
EX	EXIST DUPLEX RECEPTACLE AND WIRING TO REMAIN
	EXISTING DUPLEX RECEPTACLE AND CONNECTIONS TO BE DEMOLISHED
▶	TELEPHONE OUTLET MOUNTED 18" AFF WITH CONDUIT UP TO ACCESSIBLE CEILING & CAT 5 CABLE HOME RUN BACK TO TELE-TERMINAL BOARD

KEY PLAN



0' 2' 4' 8' 16'

SCALE: 3/16" = 1' - 0"

FOR CONSTRUCTION

REVISIONS

NO.:	DESCRIPTION:	DATE:

GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 017734 WINSTON D. RICHARDSON

7/19/2018

ELECTRICAL DEMOLITION PLAN AND NOTES

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

2538 PANOLA RD | DECATUR, GA 30058

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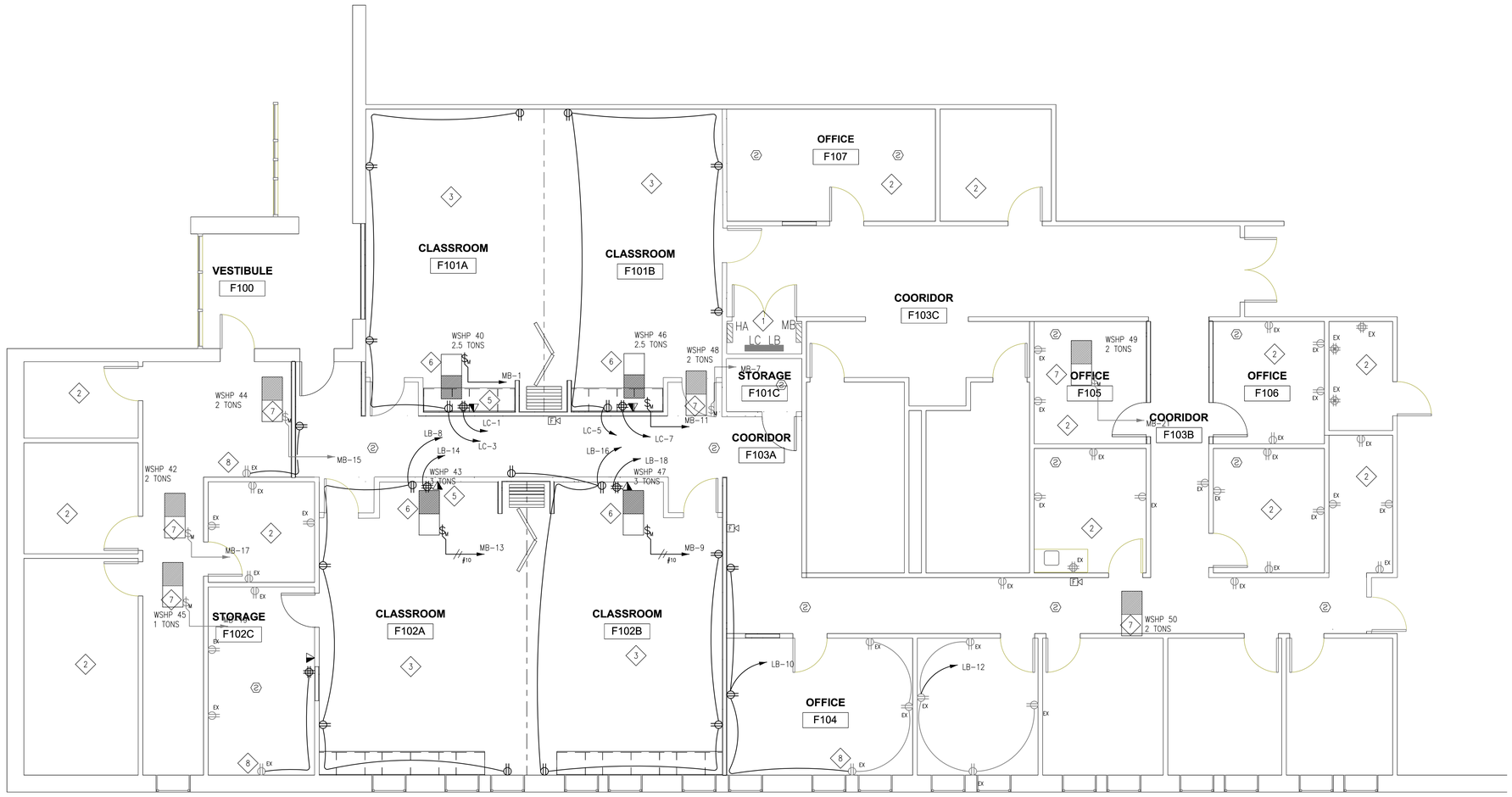
CHECKED:	WR
DRAWN :	ECSi
SCALE:	AS NOTED
DWG. DATE:	07/19/2018
PRINT DATE:	-
JOB NO.:	ECSi - 1806

SHEET

E1.1



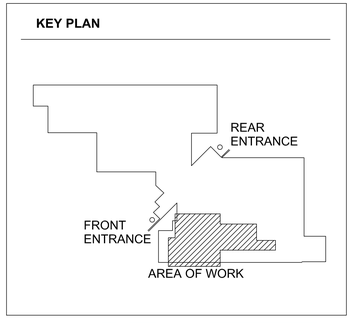
1 / E1.2 ELECTRICAL POWER AND SYSTEMS PLAN

SCALE: 3/16" = 1'-0"

1 KEY POWER NOTES:

1. PRIOR TO ANY DEMOLITION OR REWORK OF THE ELECTRICAL CIRCUITS IN THIS AREA UPDATE ALL PANELBOARD SCHEDULES AS ACTUAL CONDITIONS MAY DIFFER FROM THAT SHOWN ON THE DRAWING
2. NO WORK ON RECEPTACLE CIRCUITS IN THIS AREA. VERIFY THAT PARTS OF CIRCUITS HAVE NOT BEEN DISCONNECTED BY PARTIAL DEMOLITION.
3. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF WIRING DEVICES WITH THE ARCHITECTURAL DRAWINGS. MAINTAIN ACCESS AND CLEARANCES AS REQUIRED BY THE NEC.
4. MAKE MODIFICATION TO THE FIRE ALARM SYSTEM AS REQUIRED BY THE CODE. PROVIDE ADDITIONAL DEVICES AS REQUIRED FOR THE NEW OCCUPANCY AND MAKE CONNECTION TO THE EXISTING FIRE ALARM CONTROL PANEL FOR THE FACILITY.
5. PROVIDE JUNCTION BOX (JB) ABOVE CEILING WITH RACEWAY (3/4"C) BACK TO TELEPHONE TERMINAL CABINET (TTC) AT SERVICE POINT. PROVIDE RACEWAY UP TO CEILING FROM EACH TELEPHONE OUTLET BOX WITH CAT 5 CABLE FROM OUTLET BACK TO JB ABOVE CEILING.
6. COORDINATE WITH THE OWNERS CONTROL CONTRACTOR TO PROVIDE NEW CONTROL WIRING AS REQUIRED FOR THE NEW WSHP. WHERE POSSIBLE THE EXISTING CONTROL BOXES FOR THE RETIRING WSHP SHALL BE USED FOR THE NEW WSHP.
7. EXISTING POWER AND CONTROL WIRING FOR THE EXISTING WSHP TO REMAIN. COORDINATE WITH THE OWNERS CONTROL CONTRACTOR TO VERIFY THAT ALL SYSTEMS ARE WORKING AS REQUIRED AT THE COMPLETION OF CONSTRUCTION
8. CONNECT NEW RECEPTACLE TO THE EXISTING RECEPTACLE IN THE SPACE.

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

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7/19/2018

ELECTRICAL POWER PLAN AND NOTES

LOU WALKER SENIOR CENTER CLASSROOM RENOVATIONS

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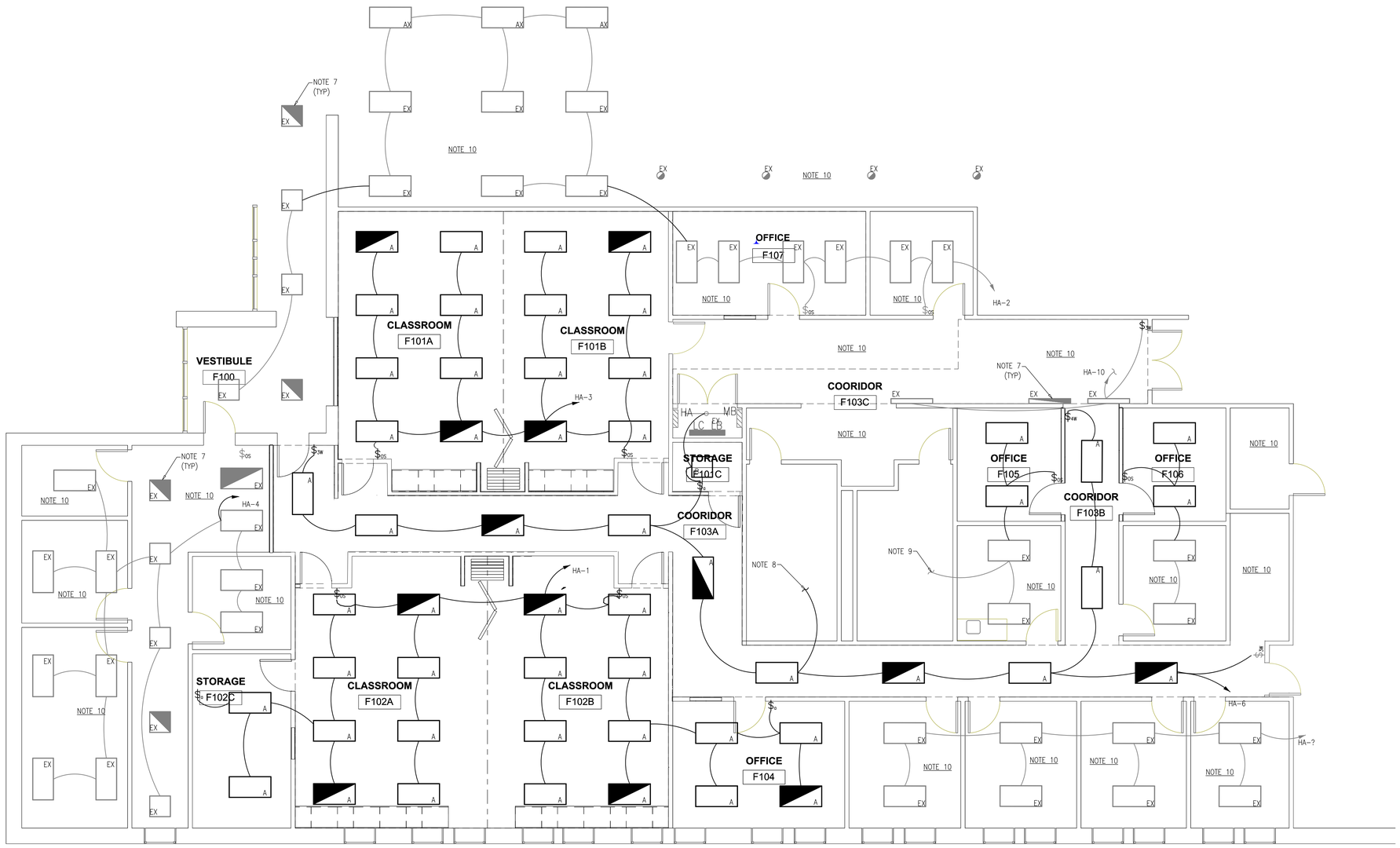
CHECKED:	WR
DRAWN:	ECSI
SCALE:	AS NOTED
DWG. DATE:	07/19/2018
PRINT DATE:	-
JOB NO.:	ECSI - 1806

SHEET
E1.2



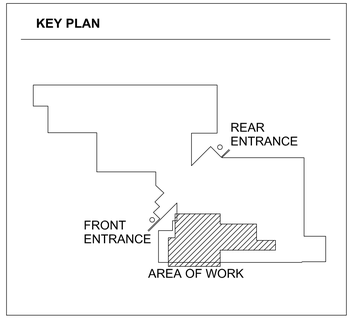
1 / E1.1 ELECTRICAL LIGHTING PLAN

SCALE3/16" – 1'-0"

LIGHTING NOTES

1. PROVIDE WIRING FOR SINGLE POLE THREE-WAY AND FOUR-WAY SWITCHES AS MAY BE REQUIRED FOR COMPLETE ELECTRICAL CIRCUITS. A SWITCH FOR LIGHTS IN A CONFINED SPACE IS DEDICATED TO THE LIGHTS IN THAT SPACE UNLESS OTHERWISE NOTED.
2. NEW EXIT AND EMERGENCY LIGHTS SHALL BE CONNECTED TO UN-SWITCHED CONDUCTOR OF LIGHTING CIRCUIT FOR THE SPACE.
3. EXIT AND EMERGENCY LIGHTS INSTALLED IN ACCORDANCE WITH THE AMERICAN DISABILITIES ACT.
4. INSTALL LIGHT SWITCHES 44" ABOVE FINISHED FLOOR (MIN) AND 4" FROM THE DOOR JAMB ON LOCKED SIDE, UNLESS OTHERWISE NOTED. MULTIPLE SWITCHES SHOWN IN THE SAME LOCATION SHALL BE INSTALLED IN MULTIPLE GANG COVER PLATES.
5. TO AVOID CONFLICT FINAL LOCATION FOR LIGHT FIXTURE AND LIGHT SWITCHES SHALL BE COORDINATED IN THE FIELD WITH THE ARCHITECTURAL AND MECHANICAL DRAWINGS PRIOR TO ROUGH IN.
6. RESTORE POWER TO ALL PARTS OF THE LIGHT CIRCUITS DISCONNECTED BY PARTIAL DEMOLITION. VERIFY THAT EXISTING CIRCUITS ARE OPERATIONAL FOR A COMPLETE ELECTRICAL SYSTEM.
7. RESTORE POWER TO ALL EXISTING LIGHT FIXTURES TO REMAIN BY RECONNECTING TO THE ORIGINAL EMERGENCY LIGHT CIRCUIT NUMBER HA-38
8. RESTORE POWER TO REST ROOM LIGHTING FRM CIRCUIT HA-6. NOTE THAT THE EMERGENCY LIGHT SHALL BE CONNECTED TO THE UN-SWITCHED CONDUCTOR OF THE LIGHT CICUIT FOR THE SPACE.
9. EXISTING WIRING FROM THE RESTROOM LIGHTING CIRCUIT
10. EXISTING WIRING FOR LIGHTING AND LIGHTING CONTROLS TO REMAIN. RESTORE POWER TO ALL PARTS OF CIRCUIT DISCONNECTED BY PARTIAL DEMOLITION.

KEY PLAN



0' 2' 4' 8' 16'
SCALE: 3/16" = 1' - 0"

FOR CONSTRUCTION

REVISIONS

NO.:	DESCRIPTION:	DATE:

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7/19/2018

ELECTRICAL LIGHTING PLAN AND NOTES

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CHECKED:	WR
DRAWN:	ECSI
SCALE:	AS NOTED
DWG. DATE:	07/19/2018
PRINT DATE:	-
JOB NO.:	ECSI - 1806

SHEET

E1.3

General Decision Number: GA190126 03/22/2019 GA126

Superseded General Decision Number: GA20180138

State: Georgia

Construction Type: Building

County: Dekalb County in Georgia.

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	02/15/2019
2	03/22/2019

ASBE0048-002 04/02/2018

	Rates	Fringes
FIRESTOPPER	$ 27.62	15.76

BOIL0026-001 03/01/2018

	Rates	Fringes
BOILERMAKER	$ 28.97	22.39

ELEC0613-014 12/01/2017

	Rates	Fringes
ELECTRICIAN (Excludes Low Voltage Wiring and Installation of Alarms and Sound and Communication Systems)	$ 31.40	31%

ELEV0032-001 01/01/2019

	Rates	Fringes
ELEVATOR MECHANIC	$ 41.36	33.705

PAID HOLIDAYS:

a. New Year's Day, Memorial Day, Independence Day, Labor Day, Vetern's Day, Thanksgiving Day, the Friday after Thanksgiving, and Christmas Day.

b. Employer contributes 8% of regular hourly rate to vacation pay credit for employee who has worked in business more than 5 years; 6% for less than 5 years' service.

ENGI0926-001 07/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Backhoe/Excavator, Bobcat/Skid Loader/Skid Steer, Bulldozer, Forklift, and Loader	$ 23.24	10.43
Crane	$ 30.63	10.88
Oiler	$ 22.35	11.08

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* PLUM0072-023 08/01/2018

	Rates	Fringes
PLUMBER	$ 28.48	15.91

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* PLUM0072-024 08/01/2018

	Rates	Fringes
PIPEFITTER (Including Installation of HVAC Pipe, HVAC Unit, & HVAC Electrical /Temperature Controls)	$ 28.48	15.91

SFGA0669-001 04/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 28.54	15.84

SHEE0085-001 07/01/2017

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct Installation; Excluding Metal Roof Installation)	$ 31.54	13.58

SUGA2012-045 08/11/2012

	Rates	Fringes
ACOUSTICAL CEILING MECHANIC	$ 15.00	0.00

ALARM INSTALLER	$ 19.36	3.78
BRICKLAYER	$ 16.00	0.00
CARPENTER (Drywall Finishing, Drywall Hanging, and Metal Stud Installation)	$ 18.22	0.00
CARPENTER, Excludes Acoustical Ceiling Installation, Drywall Finishing/Taping, Drywall Hanging, Form Work, and Metal Stud Installation	$ 21.60	4.01
CEMENT MASON/CONCRETE FINISHER	$ 13.52	0.00
ELECTRICIAN (Low Voltage Wiring and Installation of Sound and Communication Systems)	$ 21.76	5.70
FLOOR LAYER (Carpet, Vinyl and Resilient Flooring)	$ 20.00	0.00
FORM WORKER	$ 13.37	0.50
GLAZIER	$ 17.55	3.50
INSULATOR (Batt, Blown and Foam)	$ 17.67	0.14
IRONWORKER, REINFORCING	$ 20.48	8.41
IRONWORKER, STRUCTURAL	$ 20.00	0.35
LABORER: Common or General	$ 11.19	0.00
LABORER: Flagger	$ 13.44	0.00
LABORER: Landscape	$ 12.19	0.00
LABORER: Mason Tender - Brick	$ 9.00	0.00
LABORER: Pipelayer	$ 12.00	0.23
MECHANICAL INSULATOR (Insulates Duct, Pipe and Unit of Mechanical System)	$ 21.00	12.41
OPERATOR: Asphalt Spreader	$ 16.53	0.00
OPERATOR: Grader/Blade	$ 17.52	0.00
OPERATOR: Roller	$ 14.49	0.00
OPERATOR: Screed	$ 14.17	0.00
PAINTER: Brush, Roller and Spray	$ 17.40	3.87
ROOFER, Excludes Installation of Metal Roofs	$ 10.49	0.64
SHEET METAL WORKER (Metal		

Roofs Installation).....$ 21.75 0.00

TILE FINISHER.....$ 10.36 0.00

TILE SETTER.....$ 20.00 0.00

TRUCK DRIVER: Dump Truck.....$ 15.67 0.00

TRUCK DRIVER: Lowboy Truck.....$ 17.41 0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the

most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.)

and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION