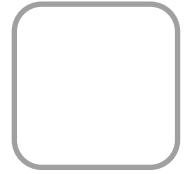




architecture



SET#

PROJECT MANUAL

**SEDGWICK COUNTY
PUBLIC SAFETY CENTER –
EMERGENCY COMMUNICATIONS
CENTER REMODEL**

**SEDGWICK CO BID PACKAGE
#22-0075**

BID DOCUMENTS
SPECIFICATIONS

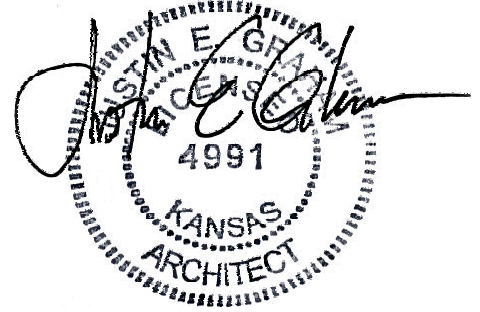
16 September 2022

SJCF Project: 5278.19

SECTION 00 01 07 - SEALS PAGE

SCHAEFER JOHNSON COX FREY ARCHITECTURE

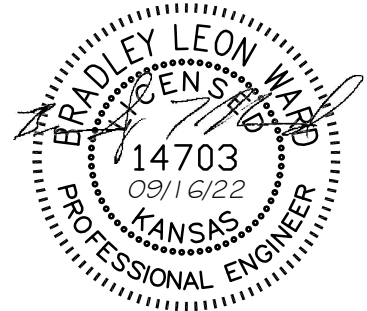
ARCHITECTS



9/16/2022

MIDWEST ENGINEERING, INC.

MECHANICAL ENGINEERS



09/16/22

INTEGRATED CONSULTING ENGINEERS, INC.

ELECTRICAL ENGINEERS



09/16/22

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2017

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END OF SECTION

Emergency Communications Remodel

INVITATION FOR BIDS

PROJECT: Emergency Communications Remodel
714 N. Main Street
Wichita, KS 67203

COUNTY BID NUMBER: 22-0075

PRE-BID MEETING:

A pre-bid meeting will be held on site. Bidders are to meet at 714 N. Main Street, Wichita, KS 67203 beginning at 10:00 am on Monday, October 3, 2022.

Attendance is not mandatory; however, this will be the only time to meet directly with County staff and the architect to answer questions concerning this project. General contractors are encouraged to have their subcontractors attend this meeting to view the site conditions.

Bidders are encouraged to examine bidding documents as early as possible. **In order to ensure each bidder has the most current information for bidding there is an established date and time for last questions to be asked. Bidders requiring clarification or interpretation of the Bidding Documents shall make such requests, in writing only, to Lee Barrier, Purchasing Agent, at Lee.Barrier@sedgwick.gov no later than 5:00 pm on Monday, October 10, 2022.**

RESPONSES TO INVITATION FOR BID:

PLEASE NOTE ADDRESS CHANGE FOR PURCHASING DEPARTMENT.

100 N. Broadway Avenue, Suite 610, Wichita, Kansas 67202

Responses will be received in the Sedgwick County Purchasing Department, located in the Finance Department until **1:45 pm on Tuesday, October 25, 2022**. Late Bids will not be accepted and will not be considered for award recommendation.

Purchasing is now offering the option of electronic bid submission.

Should you elect to participate, please email the entire document with supplementary materials to:

Purchasing@sedgwick.gov

Again, submittals are due **NO LATER THAN 1:45 pm on Tuesday, October 25, 2022**. If there is any difficulty submitting a response electronically, please contact the Purchasing Technicians at Purchasing@sedgwick.gov for assistance. Late or incomplete responses will not be accepted and will not receive consideration for final award.

If you choose to send a hard copy of your bid, Sedgwick County will not accept submissions that arrive late due to the fault of the U.S. Postal Service, United Parcel Service, DHL, FedEx, or any other delivery/courier service.

BID RESPONSES WILL BE OPENED AT: 2:00 pm on Tuesday, October 25, 2022.

This meeting will be held in the Finance Department, 100 N. Broadway, Suite 610, Wichita, Kansas, 67202. All interested parties are invited to attend this meeting, as bids/responses will be received, publicly opened and read aloud or you may listen in as the bids/responses are read into the record. If you would like to listen in, please dial our Meet Me line @ (316) 660-7271 at 2:00 pm.

After review and appropriate approval, a contract will be awarded to the lowest responsive, responsible and best bidder meeting specifications and appropriately licensed to do the specified work outlined in these documents.

Emergency Communications Remodel

Plans and specifications are available in electronic form only and may be downloaded by clicking the following link, [Sedgwick County Construction Projects](#). Company information will be collected to generate a plan holder's list which will be updated weekly and available at the **Emergency Communications Remodel** section of the [current RFP/RFQ page](#). Plans are available for **viewing only** in the County Clerk's office, 100 N. Broadway Avenue, Suite 620, Sixth Floor, Wichita, Kansas, 67202.

There will be **NO** Bid Document Deposit for this set of Documents.

A RECOMMENDATION FOR CONTRACT AWARD:

will be made to the Board of Bids and Contracts at its regular meeting at **10:00 am on Thursday, October 27, 2022**, generally held in the County Commission Meeting Room located at 525 North Main, Third Floor, Wichita, Kansas, 67203, although this date or location could change.

CONTRACT AWARD:

Board of County Commissioners will consider award on **Wednesday, November 2, 2022, although this date could change.**

PROJECT SCOPE:

This project is for the remodel of the Emergency Communications Center (2nd Floor, Public Safety Center). Demolish two office areas and conference room and expand the call center into that space. Create new centrally located supervisor platform, replace the existing access floor system with HPL (laminated) faced access floor system, lighting, modify HVAC and electrical and data connections to new station layout as required. The total remodel area is 4,245sf.

BIDDING DOCUMENTS:

1. Complete sets of Bidding Documents shall be used in preparing Bids.
2. Neither the Owner nor the Architect/Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
3. The Owner or Architect/Engineer, in making copies of the Bidding Documents available, do so only for the purpose of obtaining Bids on the work and do not confer a license or grant for any other use.
4. Bids shall include furnishing all labor, materials, equipment and performing the work for the above-described Project in strict accordance with the Bidding Documents and any Addenda.

DURING BIDDING PERIOD:

Inquiries regarding Bid Documents, Bid/Selection process or any requests for information about this specific project shall be directed in writing only to:

Lee Barrier, Purchasing Agent
100 N. Broadway Avenue, Suite 610
Wichita, KS 67202
Telephone: (316) 660-7258 Fax: (316) 383-7055
E-mail: Lee.Barrier@sedgwick.gov

All contact concerning this solicitation shall be made through the Purchasing Department.

Bidders shall not contact county employees, department heads, using agencies, evaluation committee members or elected officials with questions or any other concerns about the solicitation. Questions, clarifications and concerns shall be submitted to the Purchasing Department **in writing**. Failure to comply with these guidelines may disqualify the Bidder's response.

Emergency Communications Remodel

OWNER'S REPRESENTATION:

Owner's Representative for the duration of the Project:

Sandy Anguelov, Senior Project Manager
271 W. 3rd Street, Suite 325
Wichita, Kansas 67202
Telephone: (316) 660-9865 Fax: (316) 660-9868
E-mail: Sandy.Anguelov@sedgwick.gov

Architect's Representative:

Justin Graham, AIA, NCARB
SJCF Architecture
257 N. Broadway
Wichita, Kansas 67202
Telephone: (316) 684-0171
E-mail: jgraham@sjcf.com

BIDDER'S REPRESENTATION:

In order to induce the Owner to accept their Bid, in addition to and not in lieu of any other representations and warranties contained in the Bidding Documents, the Bidder represents and warrants the following to the Owner:

1. The Bidder and their subcontractors are financially solvent and possess sufficient working capital to complete the work, and perform all obligations hereunder.
2. The Bidder is able to provide the plant, tools, materials, supplies, equipment, and labor required to complete the work and perform the Bidder's obligations hereunder.
3. The Bidder will be authorized to do business in the State of Kansas, and will be properly licensed to do this work.
4. The Bid and execution of the Bidding Documents and the Bidder's performance thereunder are within the Bidder's duly authorized powers.
5. The Bidder has made an exhaustive study of the Bidding Documents; understands the terms and provisions thereof; and has sought or will timely seek any and all necessary clarifications prior to submitting the Bid; and that the Bid is made in accordance with the foregoing.
6. The Bidder has visited the Project and is completely familiar with the local and special conditions under which the work is to be performed and has correlated such knowledge with the requirements of the Bidding Documents.
7. The Bid is based upon the approved materials, systems and equipment described in the Bidding Documents without exception, including all warranties, coordination and components required to perform the work.
8. The Bidder certifies that their Bid is submitted without collusion, fraud, or misrepresentation as to other Bidders, so that all Bids for the Project result from a free, open and competitive bidding environment.
9. The Bidder possesses a high level of experience and expertise in the business administration, management, and superintendence of projects of the size, complexity and nature of this particular Project, and that the Bidder will work with the care, skill and diligence of such a contractor.
10. The Bidder acknowledges that the Owner is relying upon this Bidder's skill and experience in connection with the work being bid herein.
11. That complete sets of Bidding Documents were used in the preparation of the Bid and that neither the Owner nor the Architect is responsible for errors or misinterpretations resulting from the use of incomplete sets of such Documents.

The foregoing warranties are in addition to, and not in lieu of (A) any and all other liability imposed upon the Contractor by law with respect to the Contractor's duties, obligations and performance of the work and (B) any and all other warranties, representations and certifications made in the Bidding Documents. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment for the work.

Emergency Communications Remodel

All representations and warranties set forth herein and in the Contract Documents shall survive the final completion of the work or the earlier termination of this Agreement.

Bid Guarantee:

1. Bid Security is required in the amount of at least 5% of the bid plus all additional alternates. In case of multiple prices in a bid or alternate, write for the maximum possible contract amount.
2. Bid Security can be in the form of a certified or Cashier's Check or Bid Bond acceptable to Sedgwick County. Checks are to be made payable to the Sedgwick County Clerk and drawn on a solvent Kansas bank or trust company. These checks or bonds will be retained by Sedgwick County until the purchase contract has been awarded.
3. Bid Bonds shall be written by a bonding agency approved by the United States Treasury Department and licensed to do business in the State of Kansas.
4. Bid Bonds shall be submitted on AIA Document A310, latest edition, as issued and approved by the American Institute of Architects.
5. Bid Security will be retained by the Sedgwick County Clerk until the Contract for the Project has been completed and is a guarantee that if awarded the Contract, the Bidder will enter into a contract and give bonds as required. In the event the successful Bidder fails to consummate a signed Contract, through no fault of the Owner, Bid Security shall be retained by the Owner as liquidated damages and not as a penalty.
6. Sedgwick County reserves the right to retain the Bid Security of the three (3) lowest Bidders until the successful Bidder has entered into a Contract or until 60 days after Bid opening, whichever is the shorter. All other Bid Securities will be returned as soon as practicable.

Sedgwick County is desirous of allowing as many Kansas vendors as possible the opportunity to participate, including minority owned, woman owned and small businesses, in the roles of general contractors and subcontractors. If your company does not fall into either of these categories, your efforts to contract with vendors who fall in these categories are appreciated.

General Contractor will be required to maintain a subcontractor worksheet throughout the project and will submit the worksheet to County staff at any time requested but shall submit the worksheet at the completion of project.

END OF INVITATION FOR BIDS

Emergency Communications Remodel

INSTRUCTIONS TO BIDDERS

PROJECT: Emergency Communications Remodel
714 N. Main Street
Wichita, KS 67203

COUNTY BID NUMBER: 22-0075

ARCHITECT: Justin Graham, AIA, NCARB
SJCF Architecture
257 N. Broadway
Wichita, KS 67202-2303

Bids shall be made in accordance with these Instructions to Bidders:

- A. Responses to this invitation will be accepted only from General Contractors who are licensed to do business in Sedgwick County.
- B. Applications will also be accepted from General Contractors who have applied to receive a reciprocal license.
- C. A copy of General Contractor's Certificate of Insurance will be required to be submitted with the Bid at the time the bids are due. Insurance policy will be due from the successful contractor as part of the required documents prior to issuance of the notice to proceed.
- D. Bidding Documents shall include the Invitation for Bids, Bid Form, construction drawings, proposed Contract Documents, including any Addenda issued prior to receipt of Bids, supplemental information and any additional information requested.
- E. Bids must be on a lump sum basis and shall be the Contract Amount.
- F. Bidder Qualifications: For the duration of the project, all Prime Bidders shall be located within Sedgwick County, Kansas or establish an office in Sedgwick County, Kansas, and may be required by the Owner to furnish information to support the Bidder's capability to fulfill the Contract if awarded the Contract. Such information does not need to be submitted with the Bid, but may be requested at the Owner's option. Such information may include, but not be limited to, the following:
 1. Proof of registration with the Kansas Director of Taxation by non-resident Bidders (K.S.A. 79-1009).
 2. Proof of registration with the Kansas Secretary of State by foreign corporations.
 3. List of projects of similar size and type the Bidder has constructed or in which the Bidder has been engaged in a responsible capacity.
 4. Evidence the Bidder maintains a permanent place of business.
 5. A current financial statement.

Examination:

1. BEFORE SUBMITTING A BID, each Bidder shall examine carefully all documents pertaining to the work and visit the site to fully inform himself of the condition of the site and the conditions and limitations under which the work is to be performed.
2. SUBMISSION OF A BID will be considered presumptive evidence that the Bidder has fully informed himself of the conditions of the site, requirements of the Contract Documents, and of pertinent national, state and local codes and ordinances, and that the Bid made allowances for all conditions, requirements and contingencies.

Emergency Communications Remodel

3. In reviewing these Documents, it is evident that certain information, if disclosed to the public, may jeopardize the security of Sedgwick County, and appropriate measures will be taken to maintain confidentiality.
4. **In order to ensure each bidder has the most current information for bidding there is an established date and time for last questions to be asked. Bidders requiring clarification or interpretation of the Bidding Documents shall make such requests, in writing only, to the Purchasing Agent no later than 5:00 p.m. on Monday, October 10, 2022.**
5. Samples shall be submitted by the above referenced deadline to permit evaluation and notification of Bidders.
6. Any interpretation, correction or change of the Bidding Documents will be made by written Addenda. Interpretations, corrections, or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, and changes.

Addenda:

1. DISCREPANCIES OR OMISSIONS in the documents will be clarified in the form of an electronic Addendum and will be posted on the County web site. Bidders finding discrepancies, omissions, or who are in doubt as to the meaning of any portion of the Contract Documents, should immediately request an interpretation from the Senior Purchasing Agent. In response, an Addendum will be issued and the contractor shall rely solely on information contained in the written Addenda about said discrepancy or omission. **Neither the Architect nor the Owner will be responsible for any other form of instructions or interpretations given to the contractor, either verbal or written.**
2. ADDENDA received by Bidders shall be acknowledged by same on their Bid Form.

Substitutions:

1. Each Bidder represents that their Bid is based upon materials and equipment described in the Bidding Documents.
2. No substitution will be considered unless written request has been submitted to the Purchasing Agent and the Architect, in duplicate, for approval by 5:00 pm on October 10, 2022. Each such request shall include a complete description of the proposed substitute, drawings, cuts, performance or test data, or information necessary for a complete evaluation. If the Architect approves any proposed substitution, such approval will be set forth in an Addendum.

Preparation of Bids:

1. BIDS shall be made on unaltered Bid Forms furnished by the County, or detached from this Project Manual.
2. FILL IN all blanks on the Bid Form with ink or type. Blanks left on Bid Form may be cause for disqualification of Bidder.
3. SIGN BID FORM in longhand, with name typed below signature. Where Bidder is a Corporation, Bids must be signed with the legal name of the Corporation, followed by the legal signature of an officer authorized to bind the Corporation to a contract.
4. RECAPITULATION of work to be done shall not be included with any Bid.
5. Where so indicated by the makeup of the Bid Form, amounts shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

Emergency Communications Remodel

Identification and Submission of Bid:

1. Contractor shall provide one (1) Original of the Bid Response Form, Bid Security and other supplemental information required to be submitted with the Bid.
2. All of the Bid Documents shall be enclosed in a sealed envelope with the notation "Bid Enclosed" on the face. The firm name and address, Bid number, Bid opening date, and Bid opening time shall be provided in the lower left-hand corner of the Envelope.

Modification and Withdrawal of Bid:

1. A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period that a Bidder's Bid Security is held following the time and date designated for the receipt of Bids. The Bidder so agrees in submitting his Bid.
2. WITHDRAWAL BEFORE BID OPENING: A Bid may be withdrawn at any time before Bid Opening, but may not be resubmitted. If a bidder withdraws a bid, as authorized in K.S.A. 75-6905, the awarding authority may require that such bidder shall not be allowed to perform any work on the project through subcontract agreements or by any other means including re-bids.
3. AFTER BID OPENING: No Bid may be withdrawn or modified, except where the award of contract has been delayed for more than 60 days.

In the event of an Award, the lowest, responsive, responsible and best bid price meeting the specifications will be required to enter into contract required for the Project. Said Bidder shall also provide a Performance Bond for the full amount of the contract. The Performance Bond, in the amount of 100% of the Contract amount, must be submitted within 30 calendar days after award of contract. Failure to return these Documents within the required time period may cause a cancellation of the Award.

Consideration of Bids/Selection Process:

1. Bids received will be opened and read aloud publicly.
2. Owner shall have the right to determine the acceptable Bidder on the basis of the sum of the Base Bid and the Alternates accepted.
3. The Owner will award a contract to the lowest, responsive, responsible and best Bidder provided:
 - a. The Bid conforms to and has been submitted according to the requirements of the Bidding Documents and includes the Certificate of Insurance including Contractor's General Automotive Liability, Workers Compensation Insurance and Owner's Liability Insurance.
 - b. The Bid is judged to be reasonable.
 - c. The Bid does not exceed the funds available.
 - d. The Bid complies with the Instruction to Bidders and Mandatory Requirements.
 - e. The completion time is satisfactory to the Owner.
 - f. Evidence of the experience, qualifications and financial responsibility of the Bidder and his Subcontractors and the time of completion are all satisfactory to the Owner.
 - g. The County reserves the right to reject Bidders in accordance with the Bidding Documents.

Emergency Communications Remodel

4. Bids will be screened by a Review Committee consisting of the Project Manager, Architect and the Purchasing Agent.
5. No negotiations, decisions, or actions shall be initiated by any firm as a result of any verbal discussion with the Owner or employee of the Owner before the opening of responses to the document.
6. The Owner shall have the right to waive any informality and/or irregularity in any Bid received.
7. The Owner shall have the right to reject any and all Bids.

Time for Completion and Liquidated Damages:

All Bidders are required to state on the Bid Form the time needed for all work under the general contract to be completed, which would yield their best Bid. Unless otherwise required, this time frame shall be stated in calendar days and shall represent the Contractor's commitment to complete the project on schedule.

The contractual period will begin with the issuance of Notice to Proceed and continue through completion of the project.

The Agreement will include a stipulation that liquidated damages will be assessed in the amount of \$182.50 per calendar day after Completion Date that the work is not substantially complete.

Upon satisfactory completion of the Contract, a formal CERTIFICATE OF PROJECT COMPLETION will be forwarded to the Contractor by the Project Architect. The date of substantial completion of the Project will be the starting date of the warranty period.

All work shall be in accordance with all Federal and State Laws, Local Ordinances and Building Codes, and the 2010 Standards for Accessible Design.

Taxes: Materials and equipment incorporated in the work are exempt from payment of sales tax under the laws of the State of Kansas.

Project Time Line:

The following dates are provided in addition to those previously stated to help interested contractors in planning participation in the project herein. The dates listed, however, are in no way guaranteed and are subject to change without notice.

Project out for bid – Monday, September 26, 2022

Pre-bid Meeting – Monday, October 3, 2022 at 10:00 a.m.

Last questions received – Monday, October 10, 2022 at 5:00 pm.

Last Addendum Issued – Monday, October 17, 2022 at 5:00 pm.

Bids Due in Purchasing – Tuesday, October 25, 2022 at 1:45 pm.

Bid Opening – Tuesday, October 25, 2022 at 2:00 pm.

Board of Bids and Contracts – Thursday, October 27, 2022 at 10:00 am.

Board of County Commissioners – Wednesday, November 2, 2022 at 9:00 am.

Notice to Proceed:

No work shall commence until the Owner issues a Notice To Proceed, and a Notice To Proceed will not be issued until all of the following are mailed or delivered to the Project Services Office, 271 W 3rd Street, Suite 325, Wichita, Kansas, 67202, by the selected vendor:

1. The Contract signed by the representative with authority and ability to do so.

Emergency Communications Remodel

2. Performance and Statutory Bonds with the attached powers of attorney. Attach the receipt of the Clerk of the District Court to the Statutory Bond.
3. List of subcontractors and supplier's proof of a valid Contractor's license from the jurisdiction in which the work is being performed for both contractor and applicable sub-contractors is required.
4. Corporate Resolution of authority to sign and deliver the Contract Documents, executed by the Corporation's Secretary or Assistant Secretary and dated before all other dated submittals.
5. Domestic (Kansas) corporations shall furnish evidence of good standing in the form of a Certificate signed by the Kansas Secretary of State. Foreign (non-Kansas) corporations shall furnish evidence of authority to transact business in Kansas, in the form of a Certificate signed by the Kansas Secretary of State.
6. Construction Schedule with major milestones identified.
7. Insurance Certification for Payment.

Such documents must be delivered within ten (10) days of the Owner's written notification to the successful Bidder. If they are not delivered within such time then the Bidder will be deemed to have abandoned its contract with the Owner, and the Owner will award a contract to the next lowest and best Bid.

1. The successful Bidder shall not make claim either for time or money against the Owner for labor or materials performed or delivered prior to issuance of the Notice to Proceed.
2. The County's responsibility to issue a Notice To Proceed is expressly conditioned on the Contractor's timely execution and delivery of such documents.
3. The County intends to issue a Notice To Proceed within 30 days of receipt of Bids.
4. Bidders shall also note that the Work cannot begin until after a State of Kansas Sales Tax Exemption Certificate has been provided by Sedgwick County and affixed to the Purchase Order and the Notice to Proceed.
5. Contractor must submit Insurance Policy.

END OF INSTRUCTIONS TO BIDDERS

Emergency Communications Remodel

BID FORM

BID PROVIDED BY:

(Company Name)

I have received the Bid Documents, Specifications, and Construction Documents, collectively known as the Contract Documents for Construction of the

Emergency Communications Remodel

COUNTY BID NUMBER 22-0075

as prepared by the Architect Justin Graham, AIA, NCARB:

In submitting this Bid, I agree:

1. To hold my Bid open for 60 days after the date of this Bid.
2. To enter into and execute a Contract, if awarded on the basis of this Bid, and to proceed in accordance with the requirements of the General Conditions and Contract Form.
3. To provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fees, permits, licenses and applicable taxes necessary to complete the work in accordance with the proposed Contract Documents.
4. To remove and haul away from the construction site any and all debris arising from this contract and to assume sole liability for all removal, handling, and dumping of debris.
5. To comply with any and all local, state, federal or other governmental laws, rules and regulations with respect to the transportation, disposal, and dumping of debris and other excavated materials and Contractor shall secure any and all necessary permits and approvals incident to said transportation, dumping and disposal.
6. To further agree to indemnify and hold the Owner and Designer harmless from any and all claims and/or damage of any kind whatsoever as a result of the Contractor's performance of this Contract.
7. That attached to this Bid is one copy of the Certificate of Insurance including Contractor's General Automotive Liability, Workers Compensation Insurance and Owner's Liability Insurance.
8. **CALENDAR DAYS:**
The Undersigned agrees to reach substantial completion of the Work in _____ consecutive calendar days from the date of Notice to Proceed.

The Undersigned agrees to reach final completion of the Work in _____ consecutive calendar days from the date of Substantial Completion.

Total Calendar Days _____

Emergency Communications Remodel

9. **BID:**
BASE BID
To complete the Base Bid Work, in the time stipulated, in accordance with the Bidding Documents for the lump sum price of:

_____ Dollars (\$_____).

ALTERNATES:

_____ Dollars (\$_____).

10. **ADDENDA:**
The Bidder acknowledges receipt of the following numbered Addenda:

None () #1() #2() #3 () #4() #5()

11. **AGREEMENTS:**
The Undersigned agrees to the following terms and conditions:

- a. An incomplete Bid, or other information not requested which is written on this Bid Form, may be cause for rejection.
- b. Read the Invitation for Bids and the Instructions to Bidders carefully.
- c. The Owner reserves the right to reject any or all Bids and to waive all technicalities should such action be deemed to be in the best interest of the Owner.
- d. This Bid may not be withdrawn for a period of 60 calendar days following the receipt and opening.
- e. Failure to acknowledge receipt of any Addendum issued may be cause for Bid rejection.
- f. In the event that changes to the work are required, the undersigned agrees that ten percent (**10%**) total between General and Subcontractors of his net costs shall be added thereto for Overhead, Profit and General Requirements (including but not limited to, Insurance and Bonds).

12. **MAJOR SUBCONTRACTORS:**
The Undersigned acknowledges the following named major subcontractors are to be used for their respective division of work. Contractors shall identify by type, any disadvantaged, minority and women-owned businesses used as a subcontractor for this project.

Subcontractor: _____

Address – City, State, Zip: _____

Additional, if necessary:

13. **DECLARATIONS:**
The Undersigned hereby declares he has carefully examined the Drawings and Specifications, has visited the actual location of the work, has satisfied himself as to all conditions and understands that, in signing this Bid Form, he waives all right to plead any misunderstandings regarding same and agrees to be bound by the provisions of said Drawings and Specifications and all statements made therein.

The Undersigned proposes to enter into Contract and to furnish and pay for the specified Bonds and other required Documents within 10 working days after notification of award of Contract.

Emergency Communications Remodel

14. FIRM IDENTIFYING INFORMATION:

FIRM NAME _____

CONTACT _____

SIGNATURE _____ TITLE _____

PRINT NAME _____

ADDRESS _____ CITY/STATE _____ ZIP _____

PHONE _____ FAX _____ HOURS _____

COMPANY WEBSITE ADDRESS _____ E-MAIL _____

NUMBER OF LOCATIONS _____ NUMBER OF PERSONS EMPLOYED _____

TYPE OF ORGANIZATION:

Public Corporation ___ Private Corporation ___ Sole Proprietorship ___ Partnership ___ Small Business ___

General Nature of Business _____

Manufacturer ___ Distributor ___ Retail ___ Dealer ___ Service ___

___ Not Minority/Caucasian (00) publicly traded companies and nonprofits are in this category

Minority Owned Business:

___ African American (05), ___ Asian Pacific (10), ___ Subcontinent Asian (15), ___ Hispanic (20),

___ Native American (25), ___ Other (30) - Please specify _____,

___ Not Minority/Caucasian – Woman Owned (50), ___ African American – Woman Owned (55),

___ Asian Pacific – Woman Owned (60), ___ Subcontinent Asian – Woman Owned (65), ___ Hispanic –

Woman Owned (70), ___ Native American – Woman Owned (75), ___ Other – Woman Owned (80)

Insurance registered in the State of Kansas with a minimum best rating of A-VIII: ___ Yes ___ No

15. SIGNATURE AND SEAL:

DATED THIS _____ DAY OF _____, 2022.

LEGAL NAME OF PERSON, FIRM OR CORPORATION

MAILING ADDRESS OF ABOVE

SIGNATURE

TELEPHONE NUMBER

FAX NUMBER

(Affix Corporate Seal here)

E-MAIL

REQUEST FOR BID CONDITIONS

In submitting a response to this Request for Bid, vendors hereby understand the following:

1. Pricing offered in the bid document will be provided to other local governments and governments whom Sedgwick County regularly enters into cooperative agreements.
2. Sedgwick County reserves the right to reject any and/or all bids and responses to these and/or related documents, to accept any item(s) in the bids, to waive any irregularity in the bids, and further if determined to be non-responsive in any form, or if determined to be in the best interest of Sedgwick County.
3. Alternate bids (two or more bids submitted) will be considered for an award. Sedgwick County reserves the right to make the final determination of actual equivalency or suitability of such bids with respect to requirements outlined herein. The bids submitted, and any further information acquired through interviews, will become and is to be considered a part of the final completed contract. If there is any variance or conflict, the bid specifications will control.
4. Bidders MUST return the entire document via email with any supplementary materials to purchasing@sedgwick.gov, on or before the date and time specified.
5. Bids submitted may not be withdrawn for a period of 60 days immediately following the opening of this Request for Bid. Prices MUST be free of federal, state, and local taxes unless otherwise imposed by a governmental body, and applicable to the material on the bid.
6. Sedgwick County interprets the term "Lowest Responsible and Best Bidder" as requiring Sedgwick County to: (a) choose between the kinds of materials, goods, wares, or services subject to the bid, and (b) determine which bid is most suitable for its intended use or purpose. Sedgwick County can consider, among other factors, such things as the availability of service(s), part(s) material(s) and/or supply(s), warranty, maintenance, freight costs, performance of product and labor cost of items upon which bids are received.
7. All requested information must be supplied. If bidders cannot respond to any part of this request, bidders should state the reason they cannot respond and note an exception. Bidders may provide supplemental information to assist Sedgwick County in analyzing its bid.
8. If the bidder refuses or fails to make deliveries of the materials within the times specified on the face of the Request for Bid or purchase order, Sedgwick County may, by written notice, terminate the contract or purchase order.
9. The bidder will certify and warrant that goods, personal property, chattels, and equipment sold and delivered are free and clear of any and all liens, or claims of liens, for materials or services arising under, and by virtue of the provisions of K.S.A. Sections 58-201, et seq., and any other lien, right, or claim of any nature or kind whatsoever.
10. The successful bidder will hold and save Sedgwick County, and its officers, agents, servants/employees harmless from liability of any patented, or unpatented invention, process, article, or appliance manufactured, or used in the performance of the contract, including its use by Sedgwick County. Vendors working on county property or on behalf of County will be required to carry minimum insurance listed in bid document.
11. All items furnished, if applicable, must be the best of their respective kinds, and will be free from defects in material and workmanship. Items will be subject to County inspection and approval at any time within 30 days after delivery. If a substitution is made, it will be the decision of a Sedgwick County representative to determine if it is of equal quality. Items furnished must be manufactured in compliance with all existing legal or governmental directives.
12. Unless specified otherwise, all items bid are to be as a minimum but not necessarily limited to: new, current model year, and untitled prior to shipping and/or installation.
13. Sedgwick County is desirous of allowing as many Kansas vendors as possible the opportunity to participate including minority men and women-owned businesses, and small businesses in the roles of providing goods and services to Sedgwick County. If your company does not fall into any of these categories, your efforts to contract with vendors who do fall into these categories are appreciated. Construction projects utilizing subcontractors requires a subcontracting worksheet. Contact Purchasing for details.
14. Contracts entered into on the basis of submitted bids are revocable if contrary to law.

15. County reserves the right to enter into agreements subject to the provisions of the Cash Basis Law (K.S.A. 10-1112 and 10-1113), the Budget Law (K.S.A. 79-2935). Agreements shall be construed and interpreted so as to ensure that the County shall at all times stay in conformity with such laws, and as a condition of agreements the County reserves the right to unilaterally sever, modify, or terminate agreements at any time if, in the opinion of its legal counsel, the Agreement may be deemed to violate the terms of such law.
16. The Bidder agrees to comply with K.S.A. 44-1030.
 - a. The contractor shall observe the provisions of the Kansas act against discrimination and shall not discriminate against any person in the performance of work under the present contract because of race, religion, color, sex, disability, national origin, or ancestry;
 - b. In all solicitations or advertisements for employees, the contractor shall include the phrase, "equal opportunity employer," or a similar phrase to be approved by the commission;
 - c. If the contractor fails to comply with the manner in which the contractor reports to the commission in accordance with the provisions of K.S.A. 44-1031 and amendments thereto, the contractor shall be deemed to have breached the present contract and it may be canceled, terminated or suspended, in whole or in part, by the contracting agency;
 - d. If the contractor is found guilty of a violation of the Kansas act against discrimination under a decision or order of the commission which has become final, the contractor shall be deemed to have breached the present contract and it may be canceled, terminated or suspended, in whole or in part, by the contracting agency; and
 - e. The contractor shall include the provisions of subsections (a) through (d) in every subcontract or purchase order so that such provisions will be binding upon such subcontractor or vendor.
17. All project participants, consultants, engineers, contractors and subcontractors, must comply with all applicable Federal, State and County laws pertaining to contracts entered into by governmental agencies. All participants must comply with the Americans with Disabilities Act (ADA), including the 2008 ADA Amendments Act, and 2010 ADA Standards for Accessible Design.
18. Contractors/subcontractors performing new construction, maintenance, alterations, or additions to Sedgwick County buildings or facilities must comply with building guidelines/codes, and the 2010 ADA Standards for Accessible Design. Any violation of the provisions of the ADA or 504, or specification deficiencies, should be reported to the county's ADA coordinator. Failure to notify the county's ADA coordinator for remedy may be considered a breach of contract and may be grounds for cancellation, termination for suspension, in whole or in any part of the contract. All construction plans will have the county's ADA coordinator approval prior to beginning any work.
19. Contractors/vendors providing services to the public on behalf of Sedgwick County will agree that all personnel in their employment that have direct contact with the public will attend ADA Awareness and Sensitivity training provided by Sedgwick County or the Independent Living Resource Center. Training should be coordinated through the county's ADA coordinator, (316) 660-7052 and evidence of training shall be provided to the county's ADA coordinator. Any violations of the provisions of ADA or section 504, will be deemed a breach of contract and be subject to termination of contract.
20. The successful bidder may have access to private or confidential data maintained by the County to the extent necessary to carry out its responsibilities of the contract. Contractor shall be responsible for compliance with the privacy provision of the Health Insurance Portability and Accountability Act (HIPAA) and shall comply with all other HIPAA provisions and regulations applicable. If the successful bidder is a business associate as that term is defined under HIPAA, the contract shall include the County's standard business associate addendum. A copy of that standard addendum is available on request.
21. The bidder responding to this bid solicitation proposes to furnish all materials, labor, supplies, equipment and incidentals necessary to provide the equipment/materials/services described herein in accordance with the Notification of Solicitation (if applicable), Request for Information (if applicable), Request for Bid, Addenda, Contract, Bonds, Insurance, Plans, Specifications, any Instructions, Mandatory Requirements and Conditions.
22. Unless specified elsewhere in the document, all prices quoted must be F.O.B. Destination, Freight Prepaid and Allowed, which will include all delivery, handling, and any other charges related to delivery including surcharges.
23. It will be understood that the bidder's sureties and insurers, as applicable, are subject to the approval of the County.
24. Prior to a vendor being awarded a contract, Domestic (Kansas) corporations shall 1) furnish evidence of good standing in the form of a Certificate signed by the Kansas Secretary of State. Foreign (non-Kansas) corporations shall furnish evidence of authority to transact business in Kansas, in the form of a Certificate signed by the Kansas Secretary of State; and 2) a copy of the Corporation Resolution evidencing the authority to sign the Contract Documents, executed by the Corporation's Secretary or Assistant Secretary.

25. Sedgwick County will not award to any vendor that is currently listed in the exclusion records of the SAM (System for Award Management) website maintained by the General Services Administration (GSA) or to any vendor presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency.
26. Sedgwick County reserves the right to conduct background checks at any time on new or existing vendors. Background checks will be used to evaluate eligibility to be engaged in a work capacity by Sedgwick County, and will not be used to discriminate on the basis of race, sex, age, color, religion, national origin, disability, genetic, sexual orientation or veteran status.
27. Upon award, the bidder agrees to execute and deliver to the County a contract in accordance with the contract documents (if applicable) within ten days of notice of the award to the bidder. The bidder agrees that the surety/deposit given concurrently herewith will become the property of the County in the event the bidder fails to execute and deliver such contract within the specified time. In the further event of such failure, the bidder will be liable for the County's actual damages that exceed the amount of the surety.
28. It will be understood that time is of the essence in the bidder's performance. The bidder agrees that the County's damages would be difficult or impossible to predict in the event of a default in the performance hereof; and it is therefore agreed that if the bidder defaults in the performance of the contract documents, the bidder will be liable for payment of the sums stipulated in the contract documents as liquidated damages, and not as a penalty.
29. The bidder hereby certifies that he or she has carefully examined all of the documents for the project, has carefully and thoroughly reviewed this Request for Bid, has inspected the location of the project (if applicable), and understands the nature and scope of the work to be done; and that this bid is based upon the terms, specifications, requirements, and conditions of the Request for Bid documents. The bidder further agrees that the performance time specified is a reasonable time, having carefully considered the nature and scope of the project as aforesaid.
30. It will be understood that any bid and any and/or all referencing information submitted in response to this Request for Bid will become the property of Sedgwick County, and will not be returned. As a governmental entity, Sedgwick County is subject to making records available for disclosure after Board of County Commission approval of the recommendation.
31. Sedgwick County will not be responsible for any expenses incurred by any vendor in the development of a response to this Request for Bid including any onsite (or otherwise) interviews and/or presentations, and/or supplemental information provided, submitted, or given to Sedgwick County and/or its representatives. Further, Sedgwick County will reserve the right to cancel the work described herein prior to issuance and acceptance of any contractual agreement/purchase order by the recommended vendor even if the Board of County Commissioners has formally accepted a recommendation.
32. By submission of a response, the bidder agrees that at the time of submittal, he or she: (1) has no interest (including financial benefit, commission, finder's fee, or any other remuneration) and will not acquire any interest, either direct or indirect, that would conflict in any manner or degree with the performance of bidder's services, or (2) benefit from an award resulting in a "Conflict of Interest". A "Conflict of Interest" will include holding or retaining membership, or employment, on a board, elected office, department, division or bureau, or committee sanctioned by and/or governed by the Sedgwick County Board of County Commissioners. Bidders will identify any interests, and the individuals involved, on separate paper with the response and will understand that the County, at the discretion of the Purchasing Director in consultation with the County Counselor, may reject their bid/quotation. The bidder certifies that this bid is submitted without collusion, fraud or misrepresentation as to other bidders, so that all bids for the project will result from free, open and competitive bidding among all vendors.
33. No gifts or gratuities of any kind shall be offered to any County employee at any time.
34. Sedgwick County will issue a purchase order/contract for the acquisition of products/services specified as a result of an award made in reference to this document. Contract documents will be subject to any regulations governed by the laws of the State of Kansas and any local resolutions specifically applicable to the purchase.
35. Any dispute arising out of the contract documents or their interpretation will be litigated only within the courts of the State of Kansas. No prepayment of any kind will be made prior to shipment. Payment will be made upon verification of delivery, compliance with specifications, assurance that the product/service performs as specified and warranted, and receipt of correct invoicing.

36. Sedgwick County will accept responses transmitted via email to purchasing@sedgwick.gov unless stated to the contrary within this document. Bids must be received prior to the time and dates listed to be considered responsive. Sedgwick County will not accept late responses and will return them to the sender. Further, Sedgwick County will NOT: (1) guarantee security of the document received; (2) be held responsible for Bids which are NOT legible (and may choose to reject such responses); and, (3) guarantee that the receiving facsimile machine will accept transmission or that phone lines are functioning and available for transmission. Submitting a bid response via email does NOT relieve the bidder of: (1) responsibilities stated in the document (such as attendance at a mandatory pre-bid conference); (2) providing non-paper informational items which must be returned with the response (diskettes, large drawings, photographs, models, etc.); and, (3) providing original copies of bid sureties (bonds, certificates of insurance, etc.).

Emergency Communications Remodel

BONDS

PERFORMANCE AND LABOR AND MATERIAL BONDS:

PERFORMANCE AND LABOR AND MATERIAL BONDS shall be furnished to the Owner by the Contractor, in an amount equal to 100 percent of the Contract Sum as security for the faithful performance of the contractor and payment of all persons performing labor and furnishing materials in connection with the contract. Said payment bond shall also be executed as a statutory bond and filed in the office of the Clerk of the District Court of the County in which the Project is located. Contractor shall provide the Owner with a certified copy of said statutory bond as so filed.

BONDS FURNISHED shall be written by a SURETY approved by the U.S. Treasury Dept. and licensed to do business in the State of Kansas. No Work shall be commenced until bonds are in force.

FORM OF BOND shall be Statutory Payment Bond – State of Kansas.

POWER OF ATTORNEY for the surety company agent must accompany each bond issued, and must be certified to include the date of the bonds.

PROVIDE TRIPLICATE COPIES of the bond forms and power of attorney.

COST of the bonds shall be included in the bid and paid for by the Contractor.

END OF SECTION

Emergency Communications Remodel

**BOND TO THE STATE OF KANSAS
STATUTORY PAYMENT BOND
(K.S.A. 60-1111, as amended)**

WITNESSETH: That _____ (“Principal”),
and _____ (“Surety”), are
hereby jointly and severally held and firmly bound unto the STATE OF KANSAS in the sum of
_____ dollars
(\$ _____) lawful money of the United States of America, for the use and
benefit of all persons entitled thereto and for the payment of which we hereby bind ourselves,
our successors, assigns, heirs, executors and administrators.

THE CONDITION OF THE OBLIGATION IS SUCH, THAT,

WHEREAS, the Principal has entered into an Agreement with Sedgwick County, Kansas dated
_____, 2022, for improvements described as the

**Emergency Communications Remodel
714 N. Main Street
Wichita, Kansas 67203
RFB#: 22-0075**

(the “Work”) according to the Contract Documents, which are incorporated herein by reference.

NOW, THEREFORE, if the Principal and its subcontractors shall pay all indebtedness incurred
for supplies, materials or labor furnished, used or consumed in connection with the Work
including gasoline, lubricating oils, fuel oils, grease, coal and similar items used or consumed
directly in furtherance of the Work, then this obligation is to be null and void; otherwise to remain
in full force and effect.

The Surety covenants and agrees that no change, extension of time, alteration or addition to the
Contract Documents or to the Work shall in any way reduce, nullify, or affect the Surety’s
obligations on this bond; and the Surety hereby waives notice on any such change, extension of
time, alteration or additional to said Contract Documents or Work.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed and
delivered this _____ day of _____, 2022.

Principal _____

Title _____

Surety _____

Title _____

Emergency Communications Remodel

PERFORMANCE BOND

WITNESSETH THAT, _____ (“Principal”) and _____ (“Surety”) ARE HELD AND FIRMLY BOUND UNTO THE BOARD OF COUNTY COMMISSIONERS OF SEDGWICK COUNTY, KANSAS, (the “County”), for the use and benefit of claimants herein below identified in the amount of:

_____ dollars (\$_____).

and in the amount of any change orders issued for the Work, for which payment Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT,

WHEREAS, Principal has by agreement dated _____, 2022 entered into a contract with the County for the construction described as **Emergency Communications Remodel, 714 N. Main Street, Wichita, Kansas 67203** in accordance with the Contract Documents, RFB #22-0075.

NOW, THEREFORE, if the Principal shall well and truly perform all the covenants, conditions, and obligations of the Contract Documents and any Addenda and Change Orders and shall hold the County and all interested property owners harmless against all claims, loss, damage, demands, or causes of actions which they may sustain or suffer by reason of any breach of said Contract Documents or of negligence of the Principal or of improper execution of the Work or use of inferior materials by the Principal; and if said Principal shall maintain the improvements as provided for in said Contract Documents and shall make good all defects in material and workmanship for a period of one year, or for such other period as provided for in the Contract Documents; then, this obligation shall be void: Otherwise to remain in full force and effect.

FURTHERMORE, the Surety consents and agrees that no price change, extension of time, alteration, or addition to the terms of the Contract Documents or to the Work to be performed thereunder shall in any way affect Surety’s obligation on this bond; and Surety hereby waives notice of any such change, extension of time, alteration or addition to said Contract Documents.

IN WITNESS WHEREOF, the Principal and Surety have duly executed these presents all as of the day and year first above written.

Principal _____

Title _____

Surety _____

Title _____

Emergency Communications Remodel

**CERTIFIED COPY OF A RESOLUTION
OF THE BOARD OF DIRECTORS
OF _____
A KANSAS CORPORATION**

The undersigned, being the duly elected qualified and acting Secretary of _____, a Kansas corporation (the "Corporation"), hereby certifies as follows:

At a special meeting of the board of directors of the Corporation, held _____, 2022, when meeting was duly and properly called according to the by-laws of the Corporation and at which a quorum of said board was present, the following resolution was passed and adopted:

"WHEREAS, the Corporation desires to contract with Sedgwick County, Kansas (the "County") for the construction of certain public improvements, and,

"WHEREAS, the Corporation desires to authorize certain officers of the Corporation to execute and deliver to the County all agreements and documents related thereto.

"NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF _____, a Kansas corporation, that _____ (name), _____ (title), of the Corporation, be and is hereby authorized to execute and deliver to the County all contracts and documents incidental thereto, including but not limited to statutory bonds, construction bonds, insurance agreements and policies, plans and specifications, and any further documents required thereby, relating or pertaining to the following described project:

**Emergency Communications Remodel
714 N. Main Street
Wichita, Kansas 67203**

RFB #22-0075

"BE IT FURTHER RESOLVED BY THE BOARD OF DIRECTORS OF THE CORPORATION that the authority conferred hereby upon such officer is continuing unless notice in writing be given by the Corporation to the County."

DATED this _____ day of _____, 2022.

(SEAL) Secretary

Emergency Communications Remodel

EXHIBIT A

Liability insurance coverage indicated below must be considered as primary and not as excess insurance. If required, Contractor's professional liability/errors and omissions insurance shall (i) have a policy retroactive date prior to the date any professional services are provided for this project, and (ii) be maintained for a minimum of 3 years past completion of the project. Contractor shall furnish a certificate evidencing such coverage, with County listed as an additional insured including both ongoing and completed operations, except for professional liability, workers' compensation and employer's liability.

Certificate shall be provided prior to award of contract. Certificate shall remain in force during the duration of the project/services and will not be canceled, reduced, modified, limited, or restricted until thirty (30) days after County receives written notice of such change. All insurance must be with an insurance company with a minimum BEST rating of A-VIII and licensed to do business in the State of Kansas (**must be acknowledged on the bid/proposal response form**).

NOTE: If any insurance is subject to a deductible or self-insured retention, written disclosure must be included in your proposal response and also be noted on the certificate of insurance.

It is the responsibility of Contractor to require that any and all approved subcontractors meet the minimum insurance requirements.

Workers' Compensation:	
Applicable coverage per State Statutes	
\$500,000.00	Employer's Liability Insurance:
Commercial General Liability Insurance (on form CG 00 01 04 13 or it's equivalent):	
\$1,000,000.00	Each Occurrence
\$2,000,000.00	General Aggregate, per project
\$1,000,000.00	Personal Injury
\$2,000,000.00	Products and Completed Operations Aggregate
Automobile Liability:	
\$500,000.00	Combined single limit
Umbrella Liability:	
Following form for both the general liability and automobile	
<input checked="" type="checkbox"/> Required/ <input type="checkbox"/> Not Required	
\$1,000,000.00	
\$1,000,000.00	
Professional Liability/ Errors & Omissions Insurance:	
<input type="checkbox"/> Required/ <input checked="" type="checkbox"/> Not Required	
\$1,000,000.00	
\$1,000,000.00	
Pollution Liability Insurance:	
<input type="checkbox"/> Required/ <input checked="" type="checkbox"/> Not Required	
\$1,000,000.00	
\$1,000,000.00	

Special Risks or Circumstances:

Entity reserves the right to modify, by written contract, these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

CONTRACTOR IS PROVIDING CONSTRUCTION SERVICES:

In addition to the above coverages, Contractor shall also provide the following:

<p>Builder's Risk Insurance:</p>	<p>In the amount of the initial Contract Sum, plus the value of subsequent modifications and cost of materials supplied and installed by others, comprising the total value for the entire Project on a replacement cost basis without optional deductibles. Entity, Contractor, and all Subcontractors shall be included as named insureds.</p>
---	--

PROJECT SUBCONTRACTING WORK SHEET

Project Name: Emergency Communications Remodel

Check here if you are not using subcontractors

RFB Bid #:	22-0075
General Contractor:	
Created by:	

General Contractors shall provide the name, description, DBE classification (type) Minority Certification #, date of work and dollar value for each subcontractor (including lower-tier subcontractors) used to complete the referenced project. Contractors may be required to provide backup documentation to verify information. Each column requires input.

DBE classification type: African American (1); Asian (2); Hispanic (3); Native American (4); other minority (5); Women Owned Business (6). Additional general classifications: Small Business Owner (7); Does not meet any classification (0).

	Subcontractor Name and Address	Type	Jurisdiction Name & Minority Certification # (if vendor has one)	Description of Services	Date of Work	Dollar Value of work
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

Form shall be submitted to Purchasing at the completion of project.

FORM OF CONTRACT

AIA Document A107 with Supplement "Standard Form of Agreement Between Owner and Contractor For construction Projects of Limited Scope".

DRAFT AIA® Document A104™ - 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Sedgwick County Board of County Commissioners
525 N. Main
Wichita, Kansas 67203

and the Contractor:
(Name, legal status, address and other information)

«
« »

for the following Project:
(Name, location and detailed description)

«Emergency Communications Remodel
714 N. Main Street
Wichita, Kansas 67203

The Architect:
(Name, legal status, address and other information)

« SJCF Architecture »
257 N. Broadway
« Wichita, KS 67203 »
« (316) 684-0171 »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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EXHIBIT A DETERMINATION OF THE COST OF THE WORK

ARTICLE 1 THE WORK OF THIS CONTRACT

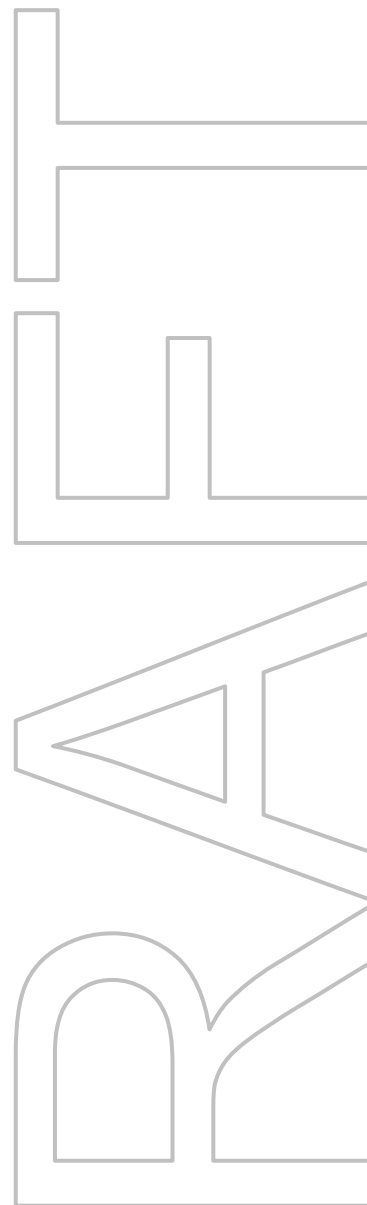
The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents listed in Article 6 of this Agreement or reasonably inferable by the Contractor from the Contract Documents as necessary to produce the results intended by the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« X »] A date set forth in a notice to proceed issued by the Owner.



[] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check the appropriate box and complete the necessary information.)

[] Not later than () calendar days from the date of commencement of the Work.

[] By the following date:

§ 2.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

Substantial Completion Date

§ 2.3.3 All times stated in the Contract Documents, including, without limitation, those for the commencement, prosecution, interim milestones, and completion of the Work, and for the delivery and installation of materials and equipment, are of the essence in this Agreement.

§ 2.3.4 The date of substantial completion of the Work or a designated portion thereof is the date, certified by the Architect, when construction is sufficiently complete in accordance with the Contract Documents that the Owner may, if it so elects, occupy and use the Work or designated portion thereof for the purposes for which it was intended.

§ 2.3.5 If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the following daily amounts commencing upon the first day following expiration of the Contract Time and continuing until the Date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed completion of the Work: One Hundred Thirty Two Dollars and Fifty Cents (\$132.50).

§ 2.3.6 The Owner may deduct liquidated damages as described in the above paragraph from any unpaid amounts then or thereafter due the Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at a rate equal to the lower of the Treasury bill rate or the highest lawful rate of interest payable by the Contractor.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's proper performance of the Contract and the completion of the Work. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[] Stipulated Sum, in accordance with Section 3.2 below

[] Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below

[« »] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be « », subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

«Value Engineer Options worksheet »

§ 3.2.2 Unit prices, if any:
(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)

§ 3.2.3 Allowances, if any, included in the stipulated sum:
(Identify each allowance.)

Item	Price

§ 3.3 Cost of the Work Plus Contractor's Fee

§ 3.3.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4 Cost of the Work Plus Contractor's Fee With a Guaranteed Maximum Price

§ 3.4.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

« »

§ 3.4.3 Guaranteed Maximum Price

§ 3.4.3.1 The sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed « » (\$ « »), subject to additions and deductions by changes in the Work as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.
(Insert specific provisions if the Contractor is to participate in any savings.)

« »

§ 3.4.3.2 The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 3.4.3.3 Unit Prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)

§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:

(Identify each allowance.)

Item	Price

§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:

« »

§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.

« »

ARTICLE 4 PAYMENT

§ 4.1 Progress Payments

§ 4.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month and the payment shall be less the specified retainage.

« »

§ 4.1.3 Provided that an Application for Payments is received by the Architect not later than the twenty-fifth (25th) day of a month, the Owner shall make payment to the Contractor not later than the third Friday of the next month. If an Application for Payment is received by the Architect after the date fixed above, payment shall be made by the Owner not later than thirty (30) days after the Architect received the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.3.1 Notwithstanding anything to the contrary in this Contract, payment of amounts due a Contractor from an Owner, except retainage, shall be made within 30 days after the Owner receives a timely, properly completed, undisputed request for payment according to terms of the contract, unless extenuating circumstances exist which

would preclude approval of payment within 30 days. If such extenuating circumstances exist, than payment shall be made within 45 days after the Owner receives such payment request.

§ 4.1.3.2 If the Owner fails to pay Contractor within the time period set in Paragraph 4.1.3.1, the Owner shall pay interest computed at the rate of eighteen percent (18%) per annum on the undisputed amount to the Contractor beginning on the day following the end of the time period set forth in Paragraph 4.1.3.1.

§ 4.1.4 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold retainage from the payment otherwise due as follows:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

« Ten percent (10%) »

§ 4.1.5 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

§ 4.2 Final Payment

§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and
- .3 a final Certificate for Payment has been issued by the Architect in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

ARTICLE 5 DISPUTE RESOLUTION

§ 5.1 Binding Dispute Resolution

For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

Arbitration pursuant to Section 21.6 of this Agreement

Litigation in a court of competent jurisdiction

Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203–2013 incorporated into this Agreement.)

«N/A »

§ 6.1.3 The Supplementary and other Conditions of the Contract are those modified and contained in the Project Manual dated _____.

Document	Title	Date	Pages

§ 6.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« »

Section	Title	Date	Pages

§ 6.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:

(Check all boxes that apply.)

Exhibit A, Determination of the Cost of the Work.

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

The Sustainability Plan:

Title	Date	Pages

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

- .2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents.)

« »

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of inconsistencies within or between parts of the Contracts Documents, or between the Contract Documents and applicable standards, codes, resolutions, and ordinances, the Contract shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement, either or both in accordance with the Architect's interpretation. The terms and conditions of this Paragraph 7.1, however, shall not relieve the Contractor of any obligations set forth in Paragraphs 9.1 and 9.6.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 7.4 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

§ 7.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 7.6 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 7.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 7.8 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 7.9.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 7.10 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or repeatedly fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

§ 8.4 Extent of Owner's Rights

§ 8.4.1 The rights stated in this Article 8 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) in law, or (iii) in equity.

§ 8.4.2 In no event shall Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for the safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Document.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Agreement, the Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climactic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Paragraph 16.2, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the contract Sum or Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Paragraph 9.1.1.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made

in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

§ 9.1.2.1 The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other contractors, is not guaranteed by the Architect or the owner.

§ 9.1.2.2 The Contractor shall, therefore, satisfy itself to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of its Work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 9.1.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

§ 9.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

§ 9.3 Labor and Materials

§ 9.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 9.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.3.4 The Contractor shall deliver, handle, store, and install materials in accordance with manufacturers' instructions.

§ 9.4 Warranty

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements shall be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage. All other warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3. The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such a manner so as to preserve any and all such manufacturer's warranties.

§ 9.5 Taxes

The Contractor shall pay sales, consumer, use, and other similar taxes that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 9.5.1 Materials

§ 9.5.1.1 Materials and equipment incorporated into this Project are exempt from the payment of sales tax under the laws of the State of Kansas.

§ 9.5.1.2 The owner will provide the contractor with a proper exemption certificate number when the notice to proceed is issued. Should the Owner fail to provide an exemption certification the Contractor shall notify the Architect in writing prior to placing any orders. The contractor shall be reimbursed for sales tax amounts for which he becomes liable until such exemption is provided.

§ 9.5.1.3 Upon issuance of a proper exemption certification number to the Contractor, the Contractor shall assume full responsibility for his own assessed penalties relating to the Contractor's improper use of the exemption certificate. Contractor shall comply with statutes of the State of Kansas related to sales tax exemption.

§ 9.5.1.4 The Contractor shall be responsible for furnishing the Owner a copy of all invoices bearing the exemption certification number pertaining to materials that are incorporated in this project.

§ 9.5.1.5 Contractor shall retain, for a period of not less than five years, all his and his subcontractor's invoices claiming sales tax exemption, properly identified with tax exemption number as required by State of Kansas.

§ 9.5.1.6 Upon completion of the Project, the Contractor shall execute and issue, to the Owner, a certificate of compliance on the form provided by the State Department of Revenue.

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

§ 9.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules, regulations and lawful orders of public authorities applicable to performance of the Work. The Contractor shall promptly notify the Architect and Owner if the Drawings and Specifications are observed by the Contractor to be at variance therewith. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, without such notice to the Architect and Owner, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised 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 Documents, and shall provide for expeditious and practicable execution of the Work.

§ 9.8.2 The Contractor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Architect.

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Architect reasonable time for review. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Architect will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. Each Party shall be entitled to rely upon the information provided by the other Party. The Architect will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Architect's review of Shop Drawings, Product Data, Samples, and similar submittals shall be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Architect will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 9.10.1 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall 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 solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

§ 9.10.2 The Contractor and any such entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner, which may be withheld in the sole discretion of the Owner.

§ 9.10.3 Without limitation of any other provision of the Contract Documents, Contractor shall use best efforts to minimize any interference with the occupancy or beneficial use of (i) any areas and building adjacent to the site of the Work, and (ii) the Building, in the event of partial occupancy. Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner.

§ 9.10.3.1 Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all resolutions, rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended for time to time. The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance with any portion of such resolutions, rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same result intended by such portions of the resolutions, rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives, or require compliance with the existing requirements of the resolutions, rules and regulations. In the even Owner requires

compliance with subsequently adopted resolutions, rules and regulations, any resulting change in the Work shall be adjusted as provided in Article 13 of the Contract.

§ 9.10.4 The Contractor shall comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project site and the Building.

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 9.13 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 9.14 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 9.15 Indemnification

§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) (including loss of use resulting therefrom), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 9.15.3 The Contractor's indemnity obligations under this Paragraph 9.15 shall also specifically include, without limitation, all fines, penalties, damages, liability, costs, and expenses (including, without limitation, reasonable attorney's fees) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, resolution, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible, (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work, and (iii) failure to secure and pay for permits, fees, approvals, licenses, and inspections, as required under the Contract Documents, or any violation of any permit or other approval of a public authority applicable to the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible.

§ 9.15.4 The Contractor shall indemnify and hold harmless all of the Indemnitees from and against any costs and expenses (including reasonable attorneys' fees) incurred by any of the Indemnitees in enforcing any of the Contractor's defense, indemnity, and hold harmless obligations under this Contract.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 10.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 10.3 The Architect will visit the site at intervals appropriate to the stage of the construction to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 10.4 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 10.5 Based on the Architect's evaluations of the Work and of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 10.6 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Architect 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 Documents.

§ 10.8 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

§ 10.9 The Architect's decisions on matters relating to aesthetic effect, in connection with administration of the Contract, will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or

Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 12.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 12.2 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.

§ 12.4 The Contractor shall, as part of the Work, provide for the coordination of work to be performed by each separate contractor engaged by the Owner, if any, with the work to be performed by the Contractor or its Subcontractors of any tier. The Contractor shall use its best efforts to cooperate with the Owner and all separate contractors, their subcontractors, and any other entity involved in the performance of the Work. In order to cause the Work and any work to be performed by separate contractors to be completed in an expeditious manner, the Contractor agrees that it will ensure that such separate contractors have a reasonable opportunity to complete their work as and when required.

§ 12.5 If any part of the Work depends on the proper performance of the work of a separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Owner any apparent discrepancies or defects in such other work that render it unsuitable and prevent the Contractor from proceeding expeditiously with the Work.

§ 12.6 If the Contractor wrongfully causes damage to the Work or the property of the Owner, the Contractor shall promptly remedy such damage. If the Contractor wrongfully causes damage to the work or property of any separate contractor, the Contractor shall promptly attempt to settle any resulting dispute or claim with such other contractor.

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor, and Architect, or by written Construction Change Directive signed by the Owner and Architect. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Architect, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the

parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The Architect will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Architect will prepare a Change Order.

§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor; provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed. No adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or that reasonably should have been disclosed by the Contractor's (i) prior inspections, tests, reviews, and preconstruction services for the Project, or (ii) inspections, tests, reviews, and preconstruction services that the Contractor had the opportunity to make or should have performed in connection with the Project.

§ 13.5 Except as permitted in Paragraph 12.1, a change in the Contract Sum or the Contract Time shall be accomplished only by a Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 13.6 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

ARTICLE 14 TIME

§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 14.2 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 14.3 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.6.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control; or (3) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the Contractor shall submit a schedule of values to the Architect before the first

Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Architect. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

§ 15.2 Control Estimate

§ 15.2.1 Where the Contract Sum is the Cost of the Work, plus the Contractor's Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor's Fee.

§ 15.2.2 The Control Estimate shall include:

- .1 the documents enumerated in Article 6, including all Modifications thereto;
- .2 a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;
- .3 a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor's Fee;
- .4 a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information, schedule of shop drawings and samples, procurement and delivery of materials or equipment the Owner's occupancy requirements, and the date of Substantial Completion; and
- .5 a list of any contingency amounts included in the Control Estimate for further development of design and construction.

§ 15.2.3 When the Control Estimate is acceptable to the Owner and Architect, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.

§ 15.2.4 The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Architect with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.

§ 15.2.5 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the Control Estimate and the revised Contract Documents.

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 15.1, for completed portions of the Work. The application shall be notarized, if required; be supported by all data substantiating the Contractor's right to payment that the Owner or Architect require; shall reflect retainage if provided for in the Contract Documents; and include any revised cost control information required by Section 15.2.4. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress

payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

§ 15.3.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

§ 15.3.5 Partial payments will be made monthly on proper application. Certification will be issued for ninety percent (90%) of the amount requested by the Contractor and approved by the Architect to be properly due until at least fifty percent (50%) of the Contract amount has been paid. Thereafter, the accumulated retainage will remain at five percent (5%) of the Contract amount (including additions, if any) except that should the Contractor at any time fail to keep current with the approved progress schedule, certification of ninety percent (90%) shall automatically again become effective and shall apply so long as the Contract progress lags behind such progress schedule.

§ 15.4 Certificates for Payment

§ 15.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner of the Architect's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluations of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 15.4.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

- .1 defective Work not remedied;
- .2 third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 15.4.4 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, that party may submit a Claim in accordance with Article 21.

§ 15.5 Progress Payments

§ 15.5.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in a similar manner.

§ 15.5.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

§ 15.5.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 15.5.4 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 15.6 Substantial Completion

§ 15.6.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 15.6.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 15.6.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. When the Architect determines that the Work or designated portion thereof is substantially complete, the Architect will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 15.6.4 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties, guarantees, operational and parts manuals required under or pursuant to the Contract

Documents shall be assembled and delivered by the Contractor to the Architect as part of the final Application for Payment. The final certificate of Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

§ 15.7.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from

- .1 liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 15.7.4 Acceptance of final payment by the Contractor, a Subcontractor or supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of the final Application for Payment.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 16.1.2 and 16.1.3. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15. When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work, as necessary, from injury by any cause. The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner and the Architect.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 Contractor's Insurance

§ 17.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Section 17.1 or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 18.4, unless a different duration is stated below:

« »

§ 17.1.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « » (\$ « ») each occurrence, « » (\$ « ») general aggregate, and « » (\$ « ») aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 9.15.

§ 17.1.3 Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than « » (\$ « ») per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 17.1.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Section 17.1.2 and 17.1.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 17.1.5 Workers' Compensation at statutory limits.

§ 17.1.6 Employers' Liability with policy limits not less than « » (\$ « ») each accident, « » (\$ « ») each employee, and « » (\$ « ») policy limit.

§ 17.1.7 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ 17.1.8 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ 17.1.9 Coverage under Sections 17.1.7 and 17.1.8 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ 17.1.10 The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Section 17.1 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 17.1.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy.

§ 17.1.11 The Contractor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor.

§ 17.1.12 To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required by this Section 17.1 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04.

§ 17.1.13 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.1, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 17.1.14 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ 17.2 Owner's Insurance

§ 17.2.2 Property Insurance

§ 17.2.2.1 The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, builder's risk insurance with a deductible not to exceed \$1000.00 and sufficient to cover the total value of the entire Project on a replacement cost basis. The Contractor's builder's risk insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed or materials or equipment supplied by others. The builder's risk insurance shall be maintained until Substantial Completion and thereafter as provided in Section 17.2.2.2, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 17.2.2.2 Unless the parties agree otherwise, upon Substantial Completion, the Contractor shall continue the insurance required by Section 17.2.2.1 or, if necessary, replace the insurance policy required under Section 17.2.2.1 with builder's risk insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 18.4.

§ 17.2.2.3 If the insurance required by this Section 17.2.2 is subject to deductibles or self-insured retentions, the Contractor shall be responsible for all loss not covered because of such deductibles or retentions.

§ 17.2.2.4 If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Contractor shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 18.4, builder's risk insurance with a deductible not to exceed \$1000.00, on a replacement cost basis, protecting the existing structure against direct physical loss or damage, notwithstanding the undertaking of the Work. The Contractor shall be responsible for all co-insurance penalties.

§ 17.2.2.5 Prior to commencement of the Work, the Contractor shall secure the insurance, and provide evidence of the coverage, required under this Section 17.2.2 and, upon the Owner's request, provide a copy of the insurance policy or policies required by this Section 17.2.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ 17.2.2.6 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.2.2, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Owner: (1) the Owner, upon receipt of notice from the Contractor, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Contractor or the Owner and (2) the Contract Time and Contract Sum shall be equitably adjusted. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide required insurance.

§ 17.2.2.7 Waiver of Subrogation

§ 17.2.2.7.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect’s consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect’s consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 17.2.2.7 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 17.2.2.8 A loss insured under the Owner’s property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements, written where legally required for validity, the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 17.2.3 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract.

§ 17.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect’s services and expenses made necessary thereby, shall be at the Contractor’s expense, unless compensable under Section A.1.7.3 in Exhibit A, Determination of the Cost of the Work. If prior to the date of Substantial Completion (for the purposes of this Agreement, a project is substantially complete when the Owner can legally take occupancy and use the facility for its intended purpose), the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to “like new” condition at no expense to the Owner.

§ 18.2 In addition to the Contractor’s obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established

under Section 15.6.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor. The Owner shall, prior to making any written claim, provide the Contractor with an opportunity to make the corrections.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

§ 18.4 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 18.5 Upon completion of any Work under or pursuant to this Article 18, the one (1) year correction period in connection with the Work requiring correction shall be renewed and recommence. The obligations under Article 18 shall cover any repairs and replacement to any part of the Work or other property caused by the defective Work.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.

§ 19.3 Tests and Inspections

Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 19.4 The Owner's representative:

(Name, address, email address and other information)

« Sandy Anguelov »
« Senior Construction Project Manager »
« 271 W. 3rd Street, Suite 325 »
« Wichita, KS 67202 »
« Sandy.Anguelov@sedgwick.gov »
« (316) 660-9865 »

§ 19.5 The Contractor's representative:

(Name, address, email address and other information)

«

§ 19.6 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 Termination by the Contractor

If the Architect fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 Termination by the Owner for Cause

§ 20.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 20.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work executed; and costs incurred by reason of such termination, including costs attributable to termination of Subcontracts.

§ 20.3.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 20.3.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall;

§ 20.3.2.1 cease operations as directed by the Owner in the notice;

§ 20.3.2.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;

§ 20.3.2.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 20.3.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered, and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits. Owner shall be credited for (i) payments previously made to the Contractor for the terminated

portion of the work, (ii) claims that the Owner has against the Contractor under the Contract, and (iii) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 16.2, shall be referred initially to the Architect for decision if the claimant recognizes the claim prior to the date of final payment. The Contractor and Owner shall not be obligated to resolve any claim, dispute or other matters related to the contract by mediation or arbitration. Any reference in the contract documents to mediation or arbitration is deemed void.

§ 21.2 Notice of Claims

§ 21.2.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the Architect within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 21.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.

§ 21.3 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.10 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

ARTICLE 22 Other Conditions or Provisions

§ 22.1 Contractor shall observe the provisions of the Kansas Acts Against Discrimination and shall not discriminate against any person in the performance of work under the present agreement because of race, religion, color, sex, disability, national origin or ancestry.

§ 22.2 In all solicitation or advertisements for employees, Contractor shall include the phrase “equal opportunity employer” or a similar phrase to be approved by the Kansas Human Rights Commission.

§ 22.3 If Contractor fails to comply with the manner in which Contractor reports to the Kansas Human Rights Commission in accordance with the provisions of K.S.A. 44-1031 and amendments thereto, Contractor shall be deemed to have breached the present contract and it may be canceled, terminated, or suspended in whole or in part, by Sedgwick County (Owner).

§ 22.4 If Contractor is found guilty of a violation of the Kansas Acts Against Discrimination under a decision of order of the Kansas Human Rights Commission which has become final, Contractor shall be deemed to have breached the present agreement and it may be canceled, terminated or suspended, in whole or in part, by Sedgwick County (Owner).

§ 22.5 Contractor shall include the provisions of the above paragraphs 22.1 through 22.4, inclusively, in every subcontract or purchase order so that such provisions will be binding upon such subcontractor or vendor.

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

« PETER F. MEITZNER, Chairman
Commissioner, First District

»
(Printed name and title)

CONTRACTOR (Signature)

« »
(Printed name and title)

Approved as to Form:

County Counselor

Attest:

Kelly B. Arnold
County Clerk



SECTION 01 10 00 - SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Sedgwick Co Public Safety Ctr. - Emergency Communications Ctr. Remodel
- B. Owner's Name: Sedgwick County.
- C. The Project consists of the alteration of the 2nd floor Emergency Communications Center.

1.02 PROJECT REQUIREMENTS

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
- B. Renovate the following areas, complete including operational mechanical and electrical work and finishes:
 - 1. Emergency Communications Center.
- C. HVAC: Alter existing system and add new construction, keeping existing in operation.
- D. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.
- E. Fire Suppression Sprinklers: Alter existing system and add new construction, keeping existing in operation.
- F. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.
- G. Owner will remove the following items before start of work:
 - 1. Furniture and equipment.

1.04 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Date of Substantial Completion. Some items include:
 - 1. Furnishings.
 - 2. Small equipment.
 - 3. WAN/LAN systems.
 - 4. General Contractor shall cooperate fully with separate contractors so work on those Contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other Contracts. Coordinate the Work of this Contract with Work performed under separate Contracts to the extent of scheduling and making the necessary spaces available.
- B. Owner will supply and install the following:

1.05 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
 - 1. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the day-to-day operations of the Owner. Maintain existing exits unless otherwise indicated
 - 2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or

- used facilities without written permission from Owner and approval of authorities having jurisdiction.
- 3. Notify the Owner not less than 72 hours in advance of activities that will affect the operations of the Owner.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Others.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Provide temporary exiting pathways where required or as indicated.
 - 3. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Utility Outages and Shutdown:
 - 1. Limit disruption of utility services to hours the building is unoccupied and as coordinated with the Owner.
 - 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 - 3. Prevent accidental disruption of utility services to other facilities.
 - 4. Do not disrupt or shut down power to LAN/WAN systems without coordination with the Owner. It is the responsibility of the General Contractor to identify these locations with assistance from the Owner prior to starting any Work.
- E. Controlled Substances: Use of tobacco products and other controlled substances within the new or existing building or the Project site is not permitted.

1.07 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner.

1.08 PERMANENT UTILITIES

- A. Owner will pay the direct cost from the utility company for the permanent service for the following:
 - 1. Electric.
 - 2. Gas.
 - 3. Water.
 - 4. Telephone.
 - 5. Cable.
 - 6. Fiber.
- B. All other fees and Work shall be included in the cost of Bid.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Copyright.
- C. AIA Documents.
- D. Electronic document submittal service.
- E. Preconstruction meeting.
- F. Progress meetings.
- G. Construction progress schedule.
- H. Contractor's daily reports.
- I. Progress photographs.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Interpretation (RFI) procedures.
- M. Additional Architectural or Engineering Work.
- N. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to SJCF:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

1.03 COPYRIGHT

- A. The Drawings and Project Manual of the Project are copyrighted by SJCF and consultants. Said drawings, details and specifications shall NOT be reproduced in any manner by any contractor, sub-contractor, supplier, or manufacturer for the purpose of preparing required submittals unless specifically directed to do so by these documents.

1.04 AIA DOCUMENTS

- A. Documents of the American Institute of Architects referred to in the specifications can be purchased by the Contractors from:
 - 1. AIA Kansas, Phone (785) 357-5308 or (800) 444-9853.

- B. **Contractors are cautioned that the AIA documents required under this Contract are copyrighted by the AIA.**

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, General Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - a. Allows for documents to be uploaded.
 2. General Contractor and SJCF are required to use this service.
 3. It is General Contractor's responsibility to submit documents in allowable format.
 4. Subcontractors, suppliers, and SJCF's consultants are to be permitted to use the service at no extra charge.
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
 8. Automatic CD archive once construction is complete.
- B. Cost: The cost of the service is to be paid by General Contractor; include the cost of the service in the Contract Sum.
- C. Submittal Service: Use one of the following:
1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com/#sle.
 2. Newforma ConstructEx: www.newforma.com/products/constructex/#sle.
 3. Procore (tel: 1-866-477-6267): www.procore.com
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of SJCF and General Contractor participating; further training is the responsibility of the user of the service.
- E. Project Closeout: SJCF will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. SJCF will schedule a meeting after Notice of Award.
- B. Attendance Required:
1. Owner.
 2. SJCF.

3. General Contractor.
- C. Agenda:
 1. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 2. Designation of personnel representing the parties to Contract, [_____] and SJCF.
 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 4. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with an electronic copy in PDF format to SJCF, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum weekly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
 1. General Contractor.
 2. Owner.
 3. SJCF.
 4. General Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with an electronic copy in PDF format to SJCF, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule every 14 days.

3.05 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 1. Date.
 2. High and low temperatures, and general weather conditions.
 3. Safety, environmental, or industrial relations incidents.
 4. Meetings and significant decisions.
 5. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in General Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 6. Testing and/or inspections performed.
 7. Signature of General Contractor's authorized representative.

3.06 PROGRESS PHOTOGRAPHS

- A. Photography Type: Digital; electronic files.
- B. Provide photographs of construction. Take photographs during construction activities where work will be concealed and throughout progress of Work. Photographs may be used to establish location and arrangement of concealed elements such as plumbing systems. These shall be part of the record documents.
- C. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 1. Delivery Medium: Jump drive.
 2. File Naming: Include project identification, date and time of view, and view identification.

3.07 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.
 - a. Do not forward requests which solely require internal coordination between subcontractors.

2. Prepare using software provided by the Electronic Document Submittal Service.
 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request General Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 2. Note dates of when each request is made, and when a response is received.
- H. Review Time: SJCF will respond and return RFIs to General Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in General Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

3.08 ADDITIONAL ARCHITECTURAL OR ENGINEERING WORK

- A. Design has been based upon product and equipment data available at the time the design work was done.

- B. Any costs for modifying construction and design for substitutes shall be the responsibility of the party making or requesting the substitute for the designed product even when the substitute product is specified. Such costs shall be paid to the Owner who shall reimburse the architect and/or consultants. The rate charged by SJCF Architecture is \$100.00 per hour. Consulting Engineers standard rates apply.

3.09 SUBMITTAL SCHEDULE

- A. Items requiring color selections, including mechanical and electrical devices, will not be made until General Contractor submits all data and samples for selecting colors and finishes.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to SJCF for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
 - 1. Physical sample(s) showing the color and other physical properties is required for selection. Electronic images or PDF's will not be reviewed for sample selection. Printed cards or brochures not containing actual physical color and finish sample(s) will not be accepted.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for SJCF's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Final Correction Punch List for Substantial Completion.
- B. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Other types as indicated.
- C. Submit for benefit of the Owner during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible

files will be rejected.

- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by SJCF.
 - 1. Retained samples will not be returned to General Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Transmit using approved form.
 - a. Use form generated by Electronic Document Submittal Service software.
 - 3. Identify: Project; General Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 - 4. Apply General Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the General Contractor, or without General Contractor's stamp will not be acknowledged, reviewed, or returned.
 - 5. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days time to and from the General Contractor.
 - b. For sequential reviews involving SJCF's consultants, Owner, or another affected party, allow an additional 7 days.
 - 6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 - 7. Provide space for General Contractor and SJCF review stamps.
 - 8. When revised for resubmission, identify all changes made since previous submission.
 - 9. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
 - 10. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
- B. Product Data Procedures:
 - 1. Submit only information required by individual specification sections.
 - 2. Collect required information into a single submittal.
 - 3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
 - 1. Digital Data Files: Electronic copies of CAD drawings or Building Information Model of the Contract Drawings will be provided by SJCF, Engineers or Consultants for Contractor's use in preparing submittals as follows.
 - a. Cost for each CAD sheet is \$150.00.
 - b. Cost for Navisworks model is \$300.00.
 - c. Contractor to sign Electronic Release Form and pay SJCF prior to receiving CAD sheet(s) or Navisworks model.
 - d. SJCF makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - 2. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.

3. Do not reproduce Contract Documents to create shop drawings.
4. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: SJCF will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: SJCF will acknowledge receipt and review. See below for actions to be taken.
- C. SJCF's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. SJCF's and consultants' actions on items submitted for review:
 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "No exception taken", or language with same legal meaning.
 - b. "Make corrections noted", or language with same legal meaning.
 - 1) At General Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Submit specified item", or language with same legal meaning.
 - 1) Submit correct item, with review notations acknowledged and incorporated. Submit separately, or as part of project record documents.
 2. Not Authorizing fabrication, delivery, and installation:
 - a. "Revise and Resubmit".
 - 1) Resubmit revised item, with review notations acknowledged and incorporated.
 - b. "Rejected".
 - 1) Submit item complying with requirements of Contract Documents.
- E. SJCF's and consultants' actions on items submitted for information:
 1. Items for which no action was taken:
 - a. "Received" - to notify the General Contractor that the submittal has been received for record only.
 2. Items for which action was taken:
 3. "Reviewed" - no further action is required from General Contractor.
- F. Maintain one complete set of submittals at the Project.

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Control of installation.
- F. Mock-ups.
- G. Tolerances.
- H. Defect Assessment.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to SJCF and to General Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by SJCF, provide interpretation of results.
 - 2. Test report submittals are for SJCF's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and General Contractor or installation/application subcontractor to SJCF, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to SJCF.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.03 QUALITY ASSURANCE

- A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of General Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Kansas.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
 1. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to SJCF for a decision before proceeding. Refer instances of uncertainty as to which two levels of quantity or quality is more stringent to SJCF for decision.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Contract Documents, request clarification from SJCF before proceeding.
 1. SJCF may select the more stringent of the two for the application intended.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of SJCF shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. General Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
- B. Employment of agency in no way relieves General Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. General Contractor Employed Agency:
 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1077, and ASTM D3740.
 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 3. Laboratory: Authorized to operate in Kansas.
 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from SJCF before proceeding.

- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Where drawings and/or specifications designate a standard of performance (e.g., fire rating, sound transmission class, insulation value, heating output, air velocity, etc.) the completed installation shall perform at least to the designated standard.
- F. Have work performed by persons qualified to produce required and specified quality.
- G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the SJCF will use to judge the Work.
- C. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable SJCF to evaluate quality of the mock-up.
- D. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- E. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- F. Obtain SJCF's approval of mock-ups before starting work, fabrication, or construction.
- G. SJCF will use accepted mock-ups as a comparison standard for the remaining Work.
- H. Where mock-up has been accepted by SJCF and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by SJCF.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from SJCF before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. See individual specification sections and the drawings for testing and inspection required.
- B. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with SJCF and General Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.

4. Promptly notify SJCF and General Contractor of observed irregularities or non-compliance of Work or products.
 5. Perform additional tests and inspections required by SJCF.
 6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of General Contractor.
 4. Agency has no authority to stop the Work.
- D. General Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify SJCF and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by SJCF.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by General Contractor.

3.05 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements at Contractors expense.
- B. If, in the opinion of SJCF, it is not practical to remove and replace the work, SJCF will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 41 00 - REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY of Reference Standards

- A. Regulatory requirements applicable to this project are the following:
- B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- C. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- D. 29 CFR 1910 - Occupational Safety and Health Standards Current Edition.
- E. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- F. ICC (IFC) - International Fire Code; 2018.
- G. ICC (IBC) - International Building Code; 2018.
- H. ICC (IBC) - ICC International Existing Building Code, 2018.
- I. IAPMO (UPC) - Uniform Plumbing Code; 2021.
- J. ICC (IMC) - International Mechanical Code; 2021.
- K. ICC (IFGC) - International Fuel Gas Code; 2021.
- L. NFPA 70 - National Electrical Code; 2020.
- M. ICC (IECC) - International Energy Conservation Code; 2006.
- N. Kansas Department of Health and Environment.
- O. Applicable State Statutes Annotated (K.S.A.).
- P. ASHRAE 90.1 - 2004.
- Q. National Fire Protection Association, National Fire Codes.
- R. American Welding Society, AWS D1.1-04.
- S. ANSI Safety Code for Elevators and Escalators, ANSI/ASME A17.1, 2004.
- T. Kansas Boiler Safety Act, KSA 44-913, 2006.
- U. All other federal, state, county, and local requirements applicable and/or referenced.

1.02 QUALITY ASSURANCE

- A. General Contractor's Designer Qualifications: Refer to Section - 01 40 00 - Quality Requirements.

1.03 BUILDING PLAN REVIEW & PERMIT:

- A. The Owner has submitted the Bidding Documents for Code Plan Review and paid the review fee.
- B. The Building Permit(s) and all other construction fees shall be included in the cost of the Work being bid.
 - 1. Development fees charged by the city/county shall be paid for by the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 42 16 - DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.
- C. Specifications.
- D. Drawings.

1.02 DEFINITIONS

- A. A great amount of the specification language can be recognized as specific definitions for nominal terms found on the drawings and in other contract documents. Certain terms used more generally throughout the Contract Documents are hereby defined as follows:
- B. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted" and "permitted" mean "directed by the Architect," "requested by the Architect," etc. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
- C. Furnish: To supply, deliver, unload, inspect for damage and ready for unpacking, assembly and installation.
- D. General Requirements: The terms "General Requirement(s)" and "Division 1 Section(s)" are alike in meaning and significance.
- E. Guarantee and Warranty: Defined to be identical in meaning and used interchangeably.
- F. Indicated: The term "indicated" is a cross reference to details, notes, or schedules on the drawings, other paragraphs or schedules in the specifications, and similar means of recording requirements in the contract documents. Where terms such as "shown," "noted," "scheduled" and "specified" are used in lieu of "indicated," it is for the purpose of helping the reader accomplish the cross reference, and no limitation of location is intended except as specifically noted.
- G. Install, Erect, Construct, and Similar Terms: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use as part of the Work.
- H. Installer: The person or entity engaged by the Contractor or his Subcontractor or Sub-subcontractor for the performance of a particular unit of Work at the project site, including installation, erection, application, and similar required operations. It is a general requirement that Installers be recognized experts in the work they are engaged to perform.
- I. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- J. Project Site: The space available to the Contractor for the performance of the Work, either exclusively or in conjunction with others performing other work as part of the Project.
- K. Provide: To furnish and install, complete and ready for the intended use.
- L. Reviewed: Where used in conjunction with the Architect's or Engineer's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the meaning of the term "reviewed" will be held to the limitations of the Architect's

responsibilities and duties as specified in the General and Supplementary Conditions and General Requirements. In no case will "reviewed" by the Architect be interpreted as an assurance to the Contractor that the requirements of the Contract Documents have been fulfilled.

- M. Supply: Same as Furnish.
- N. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and (if required) interpret the results of those inspections or tests.

1.03 PROJECT MANUAL

- A. The Project Manual is the volume(s) which binds together the Bidding Documents, General Conditions as Modified, and Specifications; identified for this Contract. The several parts of the volume(s) are listed in the Table of Contents of the volume(s).

1.04 SPECIFICATIONS

- A. General: This series of explanations is provided to assist the user of these specifications and associated contract documents to more readily understand the format, language, implied requirements and similar conventions of the content. None of these explanations will be interpreted to modify the substance of the requirements.
- B. Format Explanation: The format of the principal portions of specifications can be described as follows - although other portions may not fully comply and no particular significance will be attached to such compliance or noncompliance.
- C. Sections: Sections have been subdivided into 3 (or less) "parts" for uniformity and convenience (Part 1 -General, Part 2 - Products, and Part 3 - Execution). These do not imply a particular meaning and are not an integral part of the text which specified requirements.
- D. Imperative language is frequently used and, except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading, contrasting subjective language is frequently used to describe the responsibilities which must be fulfilled either indirectly by the Contractor or by others.
- E. Streamlined style of the specifications results in abbreviated and incomplete sentences. Omission of words or phrases such as "the Contractor shall," "according to the plans," "a," "the," and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a note occurs on the drawings.
- F. Section number is for the purposes of abbreviated identification in connection with cross references. The Sections are placed in the binder(s) in sequence; however, this sequence is not complete and the Table of Contents of the Project Manual must be consulted to determine the total listing of Sections.
- G. Pages of each Section are numbered independently for each Section. The Section number is shown with the page number at the bottom of each page. "End of Section" appears on the last page of each Section. Contractor(s) shall verify that all pages of the Specifications are included.
- H. Project identification and date of publication, and revision where applicable, of the Contract Documents are recorded on each page to minimize misuse of the specifications and confusion with other project specifications.
- I. Mechanical and Electrical Provisions: Certain portions of Mechanical Work and Electrical Work of the General Requirements have been specified in their Divisions. This is for the traditional convenience and clarity of using the Contract Documents, and no other meaning will be interpreted from this arrangement of content, except as otherwise specifically indicated. They in turn reference certain other Divisions and Sections to

minimize duplication in specifications and to correlate similar work performed by different parties.

- J. Contractors are responsible for their work regardless which Section it is included in.
- K. Contractor's Options: Where more than one set of requirements are specified for a particular unit of work. The option is intended to be the Contractor's.
- L. Specifications and Drawings Complementary: What is included in one is the same as though included in the other or included in both.
- M. Overlapping Requirements and Conflicts: In the event of conflicts between the Contract Documents or between the Contract Documents and applicable standards, codes, resolutions and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; or both in accordance with the interpretation of SJCF.
- N. Abbreviations: The language of the Specifications and elsewhere in the Contract Documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in the text. Trade associations and general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular wherever applicable and the full context of the requirement so indicated.

1.05 DRAWINGS

- A. Not all conditions have been detailed although such work is a part of the Contract.
- B. In lieu of details, some work may require conformance with written instructions, notes, and/or standards. Such work is a part of the Contract.
- C. Do not scale drawings for dimensions. Accurately layout such work from dimensions indicated unless such be found in error.
- D. Where drawings indicate a portion of the work and the remainder is shown in outline. The parts drawn out apply to other like portions of the work. Where detail is indicated by starting, only, such detail shall continue to apply throughout the courses or parts in which it occurs and apply to similar parts of work unless otherwise indicated.
- E. Details indicate the general application of work at all locations where it logically applies. Provide other related work incident thereto to fully complete the work consistent with the detail, other related details, and actual conditions.
- F. Consult Architect for interpretations concerning locations of equipment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers and enclosures.
- D. Hoisting Facilities.
- E. Fire Protection.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Field offices.
- J. Moisture and Mold Control.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

1.03 TEMPORARY UTILITIES - See Section 01 51 00

1.04 TELECOMMUNICATIONS SERVICES

- A. General Contractor shall provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
- C. Superintendent for General Contractor shall be available by cell phone or other means throughout the day.

1.05 TEMPORARY SANITARY FACILITIES

- A. General Contractor to provide and maintain required temporary facilities and enclosures. Provide at time of project mobilization.
 - 1. Temporary toilet facilities shall meet the requirements of the state and local departments of public health.
- B. Use of existing facilities is permitted.
- C. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

- A. General Contractor to provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
 - 1. Care, pruning and maintenance of trees which are to remain shall be done under the direction of and in accordance with recommendations of a qualified and approved arborist or tree trimming specialist.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 EXTERIOR ENCLOSURES

- A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.08 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces unless indicated or required otherwise:
 - 1. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.09 HOISTING FACILITIES

- A. For two stories (including roof) or less above grade; each contractor and subcontractor shall be responsible for providing their own hoisting of their own materials and debris.
- B. Elevator Use: Use of elevator(s) is permitted.
- C. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

1.10 FIRE PROTECTION

- A. General Contractor shall provide temporary fire protection. Portable fire extinguishers shall be provided with class and extinguishing agent as required by locations and classes of fire exposures. Subcontractors will be responsible for their own specialty requirements. Permanent fire protection equipment used for fire protection during construction shall be the responsibility of the installing contractor.

1.11 SECURITY

- A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. General Contractor may provide a "watchman" at their own cost.

1.12 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Existing parking areas located at [_____] may be used for construction parking.

1.13 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.

- C. Each Contractor or Subcontractor shall be responsible to collect and deposit their debris in such collection facilities. The General Contractor shall be responsible for the removal of all debris from the job site.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- F. Trash that blows onto adjacent property shall be removed by the responsible party or parties under the direct supervision of the General Contractor.
- G. Subcontractors shall collect and remove their own liquid waste and properly dispose of off-site.

1.14 FIELD OFFICES

- A. Provide space for Project meetings, with table and chairs to accommodate 6-12 persons.

1.15 MOISTURE AND MOLD CONTROL

- A. Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC system when they come available to control humidity.
 - 3. Comply with manufacturer's written instructions on products for temperature, relative humidity, and exposure to water limits.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 51 00 - TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 TEMPORARY ELECTRICITY

- A. Cost: By Owner.
- B. Power Service Characteristics: 120/208 or 120/240 volt, required ampere, three phase, four wire.
- C. Complement existing power service capacity and characteristics as required.
- D. Electrical Contractor shall provide power outlets for construction operations, with branch wiring and distribution boxes located as required so that an extension no longer than 100 feet (30 m) will reach any work station. Each Contractor shall provide their own flexible power cords as required.
 - 1. Provide sufficient capacity for construction tools, equipment, temporary ventilation and lighting.
 - 2. Modify, maintain and upon completion of project remove temporary power system.
- E. Electrical Contractor shall provide 30 Amp service to maximum of 4 construction offices.
- F. Employ permanent systems as they are completed and available.
- G. Permanent convenience receptacles may be utilized during construction.

1.03 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
 - 1. Each Contractor shall be responsible for lighting they require exceeding systems specified.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.
 - 1. Upon completion of project or when permanent system are deployed remove temporary lighting system.
- D. Permanent building lighting may be utilized during construction.

1.04 TEMPORARY HEATING

- A. Cost of Energy: By Owner.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
 - 1. For projects with masonry work scheduled during winter months the General Contractor shall pay for and provide temporary heating and tenting as required to meet project schedules.
 - 2. Subcontractors having additional specific or unusual requirements shall be responsible for their own requirements.
- C. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's existing heat plant may be used.
 - 1. Exercise measures to conserve energy.

- E. Mechanical and Electrical Contractors shall cooperate with General Contractor in making permanent system(s) available as soon as possible.
- F. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
 - 1. Warranties shall not begin on equipment until the date of substantial completion. General Contractor shall purchase extended warranties as required.

1.05 TEMPORARY COOLING

- A. Cost of Energy: By Owner.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
 - 1. Subcontractors having additional specific or unusual requirements shall be responsible for their own requirements.
- C. Owner's existing cooling plant may be used.
 - 1. Exercise measures to conserve energy.
 - 2. Provide separate metering and reimburse Owner for cost of energy used.
- D. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.06 TEMPORARY VENTILATION

- A. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

1.07 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Owner.
- B. Plumbing Contractor shall provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. General Contractor shall provide potable drinking water in convenient and accessible locations, for all persons engaged upon the work, so long as they have personnel on the job.
- D. Employ permanent systems when available and remove temporary service when no longer needed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the General Contractor; remove from site.
 - 1. The Owner has first salvage rights on materials and equipment whether identified to remain as property of the Owner or not.

2.02 NEW PRODUCTS

- A. Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Containing lead, cadmium, or asbestos.

2.03 PRODUCT OPTIONS

- A. General: The specifying of particular products, materials and systems is done to establish a minimum standard of performance, quality, type and physical characteristics.
- B. Prebid approval is required for proposed materials, equipment or systems for manufacturers not specified or listed in the Contract Documents when other manufacturers and/or products are specified and there is listed a Provision for Substitutions.
- C. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- D. Products where it is specified by name, model number or series to establish quality with a Provision for Substitutions: Use product indicated. Submit a request for substitution for any product not named.
- E. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- F. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

- G. Where Contractor proposes products or systems as a "Bidders Alternate", a request for substitution is not required. Follow requirements under section 01 23 00 - Alternates.

2.04 PRODUCT OPTIONS AFTER BID

- A. After execution of contract, substitutions of materials, equipment or systems other than those specified and approved by addendum will be approved by the SJCF only if the following are met:
1. Materials specified and ordered in a timely manner cannot be delivered to the job in time to complete the work in proper sequence.
 2. An equal or superior material is proposed.
 3. The Project cost will lower or remain unchanged.

2.05 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- F. For exterior storage of fabricated products, place on sloped supports above ground.

- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including General Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Efficiency, maintenance, or safety of any operational element.
 - 3. Visual qualities of sight exposed elements.
 - 4. Work of Owner or separate Contractor.
 - 5. Include in request:
 - a. Location and description of affected work.
 - b. Necessity for cutting or alteration.
 - c. Description of proposed work and products to be used.
 - d. Date and time work will be executed.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.03 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For surveying work, employ a land surveyor registered in Kansas and acceptable to SJCF. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.

2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.05 COORDINATION

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify SJCF four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to SJCF, Owner, participants, and those affected by decisions made.

3.04 ORDERING, RECEIVING, AND STORING MATERIALS

- A. Order materials in timely manner to assure delivery in ample time for orderly incorporation into the Work.
- B. On receipt of materials, check for in-transit damage in ample time to replace any damaged materials prior to installation time.
- C. Wherever possible deliver materials and equipment to project site in manufacturer's original packages, keeping labels intact until final cleaning. Where items are to be job-assembled, label, tag, mark or otherwise properly identify each component part until incorporated in the Work.
- D. Store materials in a manner to prevent deterioration, staining, soiling and intrusion of foreign materials. Provide waterproof well-ventilated enclosures for materials subject to deterioration by dampness. Adequately protect those materials subject to damage by freezing and frost.
- E. Remove from premises and replace with new, any materials showing deterioration or damage.

3.05 MANUFACTURER'S REQUIREMENT:

- A. All materials and equipment supplied for this building shall be installed, applied or erected in strict accordance with the manufacturer's recommendations or with manufacturer's trade association requirements unless the specifications bound herewith exceed those requirements.
 - 1. Exception: Methods or procedures, set forth in the manufacturer's recommendations which the Contractor finds unacceptable shall be submitted to SJCF in writing for clarification.

3.06 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.
- F. Prepare all work to receive subsequent work or finish as needed and described in specifications for both substrate and subsequent products.
- G. Furnish, apply, install, connect, erect, clean and condition manufactured articles, materials, and equipment per manufacturer's printed directions. If otherwise indicated or specified, notify SJCF well in advance of installation and prerequisite construction.
- H. Manufacturer's printed directions must be on job prior to and during installation of materials and equipment.
- I. Provide all attachment devices and materials necessary to secure materials together or to other materials and to secure work of other trades.
- J. Make allowance for ample expansion and contraction for all building components subject to same.
- K. Each trade shall build in openings required for their own work and sleeves furnished by another trade for their work and prepare openings when another trade requires and furnishes the information in a timely manner. Each trade shall be responsible for cutting into construction when they have not acted in timely manner; all in accordance with CUTTING AND PATCHING in this section. Each trade shall be responsible for filling around their work, within blockouts, sleeves, and holes for their work, to maintain the integrity (acoustic, fire, smoke, appearance, etc.) of the construction.
- L. Where proper fit of work depends upon close tolerances of manufactured products, furnish manufacturer with necessary templates to insure proper fit of all components.
- M. Install materials only when conditions of adjacent building components are conducive to achieving best installation results.
- N. Construct job assemblies accurately and as necessary for other trades having adjunct work. Correct errors in cutting, shop fabrication and installation. Where necessary to cut into other building components, do so only in a manner not to damage building structurally nor aesthetically, then repair adjoining parts and materials thoroughly and neatly.
- O. Erect, install and secure building components in a structurally sound and appropriate manner. Where necessary, temporarily brace, shore, or otherwise support members until final connection or installation. Brace walls and other structural elements to prevent damage by wind and construction operations. Leave temporary bracing, shoring, or other structural supports in place as long as necessary for safety and until structure is strong enough to withstand all loads involved.
- P. Where construction consists of a series of courses or units, assemble units in best acceptable manner to provide structurally sound installation, waterproof where exposed to exterior. Accurately plumb and level all courses and verify levels of frequent courses with instrument.

- Q. Handle materials in manner to prevent scratching, abrading, distortion, chipping, breaking or other disfigurement to those materials as well as to materials and construction already existing.
- R. Unless indicated, fabricate and install materials true to line, plumb and level. Leave finished surfaces smooth and flat or of smooth contour where indicated, free from wrinkles, warps, scratches, dents, and other imperfections
- S. Provide quality of workmanship not less than the commercially accepted standards of that trade.
- T. Where obviously of best practice, furnish materials in longest practical lengths and largest practical sizes to avoid unnecessary jointing. Make all joints secure.
- U. Consult SJCF for mounting height or position of any unit not specifically located.
- V. Mix no more materials than can be used before materials begin to "set". Mix no partially "set" batch with another. Clean tools and appliances prior to mixing materials that can be contaminated.
- W. Conduct work in a manner to avoid injury to previously placed work.
- X. Do not disturb materials requiring curing time until appropriate curing time has transpired.
- Y. Install, connect, service, and operate permanent systems at earliest practical dates, except as may be modified by specification section 01 51 00.

3.07 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to SJCF before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and LAN/WAN/Data Systems): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings as indicated; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to SJCF.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for SJCF review and request instructions.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

3.08 CUTTING AND PATCHING

- A. **Prior approval for cutting and patching is required unless waived by the SJCF.**
- B. **Approval of SJCF to proceed with proposed cutting-and-patching does not waive right to later require complete removal and replacement of work found to be cut-and-patched in an unsatisfactory manner.**
- C. General:
 - 1. "Cutting-and-patching" is hereby defined to include, but is not necessarily limited to; the cutting and patching of nominally completed and existing work, in order to accommodate the coordination of work, or the installation of other work, or to uncover other work for access or inspection, or to obtain samples for testing, or for repair or correction, or for similar purposes.
 - 2. Patching also is defined as repair to new or existing landscaping or other features.
 - 3. Existing work shall be prepared, cleaned, and patched as required for new work by appropriate trades, ready for the subsequent finishes.
 - 4. Excavating and the associated operations of boulder removal, dewatering, bracing, removal of underground debris, penetration of rock and other barriers, backfilling, and similar work as specified in Division 31 and in other contract documents, may be required as a special form of cutting-and-patching, but is recognized primarily as an example of a related-but-separate category of work.
 - 5. Restoring or removing and replacing non-complying work may require cutting-and-patching operations as specified herein.
 - 6. Refer to other sections of these specifications and all drawings for ramifications regarding work necessary to accomplish installation of items shown.
 - 7. Each trade shall be responsible for the sizing, location, timing, coordinating and cost for cutting and patching necessary to accommodate their work. Cutting and patching shall be done by individuals skilled in working the tools and materials involved.
- D. Quality Assurance:
 - 1. Requirements for Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
 - 2. Operational and Safety Limitations: Do not cut-and-patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety. Operational elements include but are not limited to the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Fire alarm and Communication systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
4. Visual Requirements: Do not cut-and-patch work which is exposed on the exterior or exposed in occupied spaces of the building, in a manner resulting in a reduction of visual qualities or resulting in substantial evidence of the cut-and-patch work, both as judged solely by the Architect. Remove and replace work judged by the Architect to be cut-and-patched in a visually unsatisfactory manner. Trade requiring cutting may use small escutcheons or similar trim at piping, ducts and the like, if permitted for new work, and not as a device to cover work which should be patched.
 5. Engage the original Installer/Fabricator to perform cutting-and-patching in new construction. Engage capable personnel to perform cut-and-patch work.
- E. Submittals:
1. Unless waived by SJCF, submit proposal well in advance of time work will be performed and request approval to proceed. Include description of why cutting-and-patching cannot (reasonably) be avoided, how it will be performed, products to be used, firms and tradesmen to perform the work, approximate dates of the work, and anticipated results in terms of variations from the work as originally completed.
 2. SJCF may require that the Contractor provide structural engineering services through the project structural engineer at the Contractor's expense.
 3. Where applicable, include cost proposal, suggested alternatives to the cutting-and-patching procedure proposed
- F. Materials: Provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the requirements, and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.
- G. Whenever possible, execute the work by methods that avoid cutting or patching.
- H. See Alterations article above for additional requirements.
- I. Perform whatever cutting and patching is necessary to:
1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- J. Protection: Construct barriers to separate work areas from occupied areas and to protect building occupants from danger of uncontrolled temperature and pollution. Seal openings as needed to provide such protection.
1. Ventilate areas where dust and odors are produced to the outside.
 2. Provide and maintain filters over building ventilating and return air outlets enveloped by dust enclosures when system ties into occupied areas.
- K. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize

damage and restore to original condition.

- L. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - 1. Minimize the use of hammering and chopping tools.
- M. Restore work with new products in accordance with requirements of Contract Documents.
- N. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- O. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- P. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance unless otherwise indicated.
 - 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary or as indicated to provide an even-plane surface of uniform appearance.
 - 4. Match color, texture, and appearance.
 - 5. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
 - 6. Restore exposed finishes of patched areas, and where necessary, extend finish restoration and new finish onto adjoining retained work, in a manner which will eliminate evidence of patching. As an example; where patch occurs in or adjacent to a painted surface, extend final paint coat over the entire unbroken surface containing the patch after patched area has received prime and base coats and whole surface prepared for painting.

3.09 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
 - 1. Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.10 PROTECTION OF INSTALLED WORK

- A. Protect existing construction, property and installed work from damage by construction operations, weather and its elements.
- B. Provide special protection where specified in individual specification sections.

- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.
- I. Remove ice and snow as necessary for safety and proper execution of Work.
- J. Brace all construction to prevent damage from wind and construction loading.
- K. Transport, handle, store and erect materials in a manner to keep them free from injury.
- L. Repair damaged materials, systems, equipment and the like. If satisfactory repair cannot be attained, replace damaged products with equally aesthetic and serviceable products, systems and equipment.
- M. Clean off any foreign materials accidentally deposited on finish surfaces and, where such would stain, corrode or otherwise disfigure, clean same immediately with material that will not damage finished work.

3.11 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify SJCF and Owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable General Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.12 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.

3.13 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Adjust windows, doors, drawers, hardware, appliances, motors, valves, controls, and other equipment for proper operation.
- C. Seal exterior joints between materials to form a weathertight enclosure.

- D. Touch up imperfections in surfaces, paint, and other finishes after all Contractors and tradesmen have completed their work.
- E. Completed work shall be thoroughly clean and free from foreign materials and stains.
- F. Clean surfaces using appropriate materials and methods that will thoroughly clean but not damage materials and their finishes, not damage or adversely affect other materials in the project.

3.14 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
 - 2. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances
- G. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- H. Replace filters of operating equipment.
- I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- J. Clean site; sweep paved areas, rake clean landscaped surfaces.
- K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.15 CLOSEOUT PROCEDURES

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following:
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Advise Owner of pending utility changeover requirements if applicable.
 - 4. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 8. Complete final cleaning requirements, including touchup painting.

9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Make submittals that are required by governing or other authorities.
 1. Provide copies to SJCF.
- C. Notify SJCF when work is considered ready for SJCF's Substantial Completion inspection.
- D. Submit written certification containing General Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete (by General Contractor and Subcontractors) in accordance with Contract Documents and ready for SJCF's Substantial Completion inspection.
 1. Separate inspections for mechanical, electrical and general construction work and equipment shall be arranged in the same basic time period by SJCF, engineers and consultants.
 2. SJCF may decline to perform the inspection if the building (or designated portion) can not be used for the intended purpose.
 3. SJCF may also terminate the inspection at any time if the amount and/or type of incomplete work demonstrates that the building can not be used for the intended purpose without generating an inspection report.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing SJCF's and General Contractor's comprehensive list of items identified to be completed or corrected and submit to SJCF.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify SJCF when work is considered finally complete and ready for SJCF's Substantial Completion final inspection.
- H. Complete items of work determined by SJCF listed in executed Certificate of Substantial Completion.
- I. All additional inspections incurred by SJCF and/or consultants because of incomplete or unsatisfactory work will be charged to the General Contractor. Time will be billed through the Owner at \$100.00 per worker hour for time chargeable to the Project whether on site, traveling, or in office. Payments to be deducted from amounts owed to the General Contractor by the Owner without any additional action required by the Owner, SJCF, or General Contractor.

3.16 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.

END OF SECTION

SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties.

1.02 SUBMITTALS

- A. Project Record Documents: Submit documents to SJCF with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance. Submit two copies.
- C. Warranties:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- D. Consent of Surety to Final Payment, on AIA Form G707. Submit three copies.
- E. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706. Submit three copies.
- F. Contractor's Affidavit of Release of Liens, AIA Document G706A. Submit three copies.
- G. Contractor's Release or Waiver of Liens, conditional upon receipt of payment, on the Contractor's letterhead. Submit three copies.
 - 1. The Owner reserves the right to require any other data necessary to establish satisfactory payment of all contractual obligations.
- H. Sales Tax Exemption Certificate. Submit two copies.
- I. If required by Owner or SJCF, one copy each of all invoices properly identified with the Sales Tax Exemption number as required by the State of Kansas. The Contractor shall retain such invoices for a period of not less than five years.
- J. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Field changes of dimension and detail.
 - 3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- B. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- C. Additional information as specified in individual product specification sections.

- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Include test and balancing reports.
- J. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabs dividing each system.
- C. Submit operations and maintenance manuals in a PDF electronic file.
- D. Project Directory: Title and address of Project; names, addresses, and telephone numbers of SJCF, Consultants, General Contractor and subcontractors, with names of responsible parties.
- E. Tables of Contents: List every item by a bookmark that allows for easy access of content.
- F. Arrangement of Contents: Organize as follows:
 - 1. Project Directory.
 - 2. Table of Contents.
 - 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Photocopies of warranties and bonds.

4. Design Data: To allow for addition of design data furnished by SJCF or others, provide a bookmark "Design Data".

3.06 WARRANTIES

- A. For all pieces of operating equipment and system provided by any trade for this Project and when warranties or guarantees are otherwise specified, submit written guarantee or warranty documents which shall include the following information:
 1. Name and address of Project and Owner.
 2. Article, material or system covered.
 3. Name and address of Installing contractor.
 4. Name and address of Prime Contractor.
 5. Signature of individual authorized to sign contracts for the company issuing the guarantee.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Scan warranties and assemble complete warranty submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- D. The following terms (minimum) shall be incorporated:
 1. Duration, one year or as specified, dated from "Date of Substantial Completion." This shall be in addition to and not a limitation of other rights the Owner may have under the Contract Documents.
 2. The article, material or system is free from defective materials and workmanship.
 3. Costs of repair or replacement shall not accrue to the Owner including repair or replacement of other work disturbed by repair or replacement.
- E. Guarantees which are standard guarantees provided by a manufacturer for his product shall be received by the Contractor, filled out and filed with the company for the Owner. Certificates or registration stubs shall be included with the shop drawings submitted for the Owner upon completion of the work. The Contractor's responsibility stipulated in the paragraph before this one, terminates as stipulated therein. The Owner shall administrate manufacturer's warranties/guarantees thereafter.
- F. Co-execute submittals when required.

END OF SECTION

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
 - 1. All software-operated systems.
 - 2. HVAC systems and equipment.
 - 3. Electrical systems and equipment.
 - 4. Items specified in individual product Sections.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Reports:
 - 1. Identification of each training session, date, time, and duration.
 - 2. Sign-in sheet showing names and job titles of attendees.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge General Contractor for personnel "show-up" time.

1. Installing subcontractor/supplier, SJCF, Engineer/Consultant shall be invited.
- C. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
1. The location of the O&M manuals and procedures for use and preservation; backup copies.
 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- D. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by General Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- E. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 02 41 00 - DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on General Contractor's use of site and premises.
- B. Section 01 10 00 - Summary: Sequencing and staging requirements.
- C. Section 01 10 00 - Summary: Description of items to be removed by Owner.
- D. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by General Contractor.
- E. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- F. Section 01 57 13 - Temporary Erosion and Sediment Control.
- G. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- H. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

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

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with other requirements specified in Section 01 70 00.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Provide, erect, and maintain temporary barriers and security devices.
 - 3. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 5. Do not close or obstruct roadways or sidewalks without permit.
 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Do not begin removal until built elements to be salvaged or relocated have been removed.
- E. Protect existing structures and other elements that are not to be removed.
- F. Promptly repair damages caused to adjacent facilities by demolition work.
- G. If hazardous materials are discovered during removal operations, stop work and notify SJCF and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Dismantle existing construction and separate materials.
 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- I. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

3.02 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Unused underground piping may be abandoned in place provided it is completely drained and capped; remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.03 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to SJCF before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Demolition work for remodeling and replacement of work within existing remaining building shall be done by subcontractors and trades who shall be responsible for removing equipment and materials from the building. Except for Owner's salvage, items removed shall become the property of General Contractor. Refer Section 01 10 00, who shall also be responsible for disposing of it as waste or salvage. Owner has first salvage rights.
- C. Demolition work is not specified in detail. Much of the work will be implied by indications on the drawings. For example, removing of a wall may involve removal and patching of the surface preparatory for new finish; piping being removed to at least behind the wall surface; removal of systems extending into areas not being demolished but systems will become inoperative. Complete removal of such systems may not be required except to avoid conflict with other work and finished appearance; removal of doors will involve removing of anchorage, furring, grounds, etc.
- D. Work is shown and called out to be "removed." When the word "removed" is used without any modifiers, it shall mean that it and any associate items built with or into it shall be disconnected, removed, services terminated, or treated as otherwise noted.
- E. Where "removed" is modified those instructions shall be followed. Remaining construction shall be patched and finished equivalent to other similar and remaining work.
- F. Separate areas in which demolition is being conducted from other areas that are still occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 .
- G. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 1. Provide adequate dams and protection to prevent rain water from entering into the existing building.
- H. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
 2. Stock pile removed items such as existing ceiling tile, glazed tile block and trim which is removed as part of the demolition work to be used as patch materials to match surrounding surfaces where areas are indicated to be patched or filled.
- I. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 3. See Section 01 10 00 for other limitations on outages and required notifications.
 4. Verify that abandoned services serve only abandoned facilities before removal.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings or in tunnels where indicated; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- J. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - a. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
 - b. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch as specified for patching new work.
- K. Moveable Equipment: The Owner shall cooperate with the General Contractor and will move their property and the residents as specified in 01 10 00 Sequencing and staging requirements. The General Contractor shall schedule and coordinate the work with the Owner to allow time to accomplish the work. There may be times and situations when minimal amount of work is required that the General Contractor will find it expeditious to move furniture out of workers way. Perform such work.

3.04 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
 1. Legally dispose of materials in a landfill. Do not burn demolished materials.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concealed wood blocking, nailers, and supports.
- B. Miscellaneous wood nailers, furring, and grounds.

1.02 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard 2022.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).
- E. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series) 2012 (Reaffirmed 2021).
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- G. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2021a.
- H. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2021a.
- I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- K. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.
- L. PS 1 - Structural Plywood 2009 (Revised 2019).
- M. PS 2 - Performance Standard for Wood Structural Panels 2018.
- N. PS 20 - American Softwood Lumber Standard 2021.
- O. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- P. SPIB (GR) - Grading Rules 2014.
- Q. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting

the specified requirements.

2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.

2.02 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 1. Lumber: S4S, No. 2 or Standard Grade.
 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- B. Other Applications:
 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M or Type 304 stainless steel for high humidity locations, preservative-treated wood locations and fire-retardant treated wood locations, unfinished steel elsewhere.
 2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
 - a. Sustain a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete.
 3. Nails, Brads, and Staples: ASTM F1667.
 4. Power-Driven Fasteners: NES NER-272.
 5. Wood Screws: ASME B18.6.1.
 6. Lag Bolts: ASME B18.2.1.
 7. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.

- B. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- D. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- E. Fit carpentry to other construction; scribe and cope as required for accurate fit.
- F. Countersink nail heads on exposed carpentry work and fill holes with wood filler.
- G. Pre-drill members for fasteners when necessary to avoid splitting wood.
- H. Countersink bolt heads, nuts and washers where required. Countersink only depth needed to bring bolt head or nut flush with face of lumber maintaining as much of the secured member wood under anchorage as possible.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
 - 1. Blocking is not required to be treated, unless in contact with concrete slab on grade.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In wood framed assemblies with attics provide wood fireblocking of gypsum board, wood sheathing or dimensional lumber for draftstopping as required by applicable local code or as indicated.
- D. In metal stud walls, provide continuous blocking around door and window openings for anchorage of wood frames and/or trim, securely attached to stud framing.
- E. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- F. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring: Reference Structural drawings for fastening requirements to framing; staples are not permitted.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. In shear walls, at all edges provide solid edge blocking where joints occur between roof framing members.
 - 2. Reference Structural drawings for fastening requirements of panels to framing; staples are not permitted.
 - 3. Allow 1/8 inch (3 mm) spacing between panels edges.
- C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using fasteners as indicated on Structural drawings.
- D. Wall Sheathing, Glass mat faced gypsum: Secure with long dimension perpendicular to wall studs, with ends over firm bearing, using rust-resistant, bugle or wafer head, coarse thread, 1 1/4 inch (31 mm) length wood fasteners unless otherwise indicated. Attach with screws spaced 8 inches (203 mm) on center at perimeter where there are framing

supports and 8 inches (203 mm) on center along intermediate framing in the field.

- E. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size and Location: As indicated on drawings.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.06 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units. All cabinets to be fabricated to the design and dimensions indicated on the plans.
- B. Cabinet hardware.
- C. Preparation for site finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 91 23 - Interior Painting: Site finishing of cabinet exterior.
- C. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications 2022.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWI (QCP) - Quality Certification Program Current Edition.
- D. BHMA A156.18 - Materials and Finishes 2020.
- E. BHMA A156.9 - Cabinet Hardware 2020.
- F. GSA CID A-A-1936 - Adhesives, Contact, Neoprene Rubber 1996a (Validated 2013).
- G. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. PS 1 - Structural Plywood 2009 (Revised 2019).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS).
 - 3. Show locations and sizes of concealed blocking specified in other Sections.
 - 4. Show locations for plumbing fixtures and other items installed in Architectural Wood Casework.
- C. Product Data: Provide data for hardware accessories.
- D. Samples For Initial Selection: Samples for initial selection purposes of the following in form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of material indicated.
 - 1. Plastic laminate
 - 2. PVC edge banding
 - 3. Cabinet liner material

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of experience.
- B. Installer Qualifications: Company specializing in installation of the products specified in this section with minimum three years of experience.
- C. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality standards. Certification is not required.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
- C. Do not deliver woodwork until painting, wet work, grinding, and similar operations have been completed in installation areas.

1.08 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
 - 1. Building shall be enclosed, wet work shall be complete, and HVAC system shall be operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Plastic Laminate Cabinets:
 - 1. Exposed Surfaces:
 - a. Horizontal Surfaces Other Than Tops: Grade HGS.
 - b. Vertical Surfaces: Grade VGS.
 - c. Edges: PVC edge banding
 - 2. Semi-exposed Surfaces:
 - a. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - b. Edges: PVC edge banding
 - 1) All edges, including adjustable shelves, shall have PVC edge banding on all sides.
 - c. For semi-exposed backs of panels, including back side of doors, with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 - d. For tops of upper cabinets and tall storage units: Thermoset decorative panels.

- e. For bottom side of upper cabinets: High-pressure decorative laminate, Grade VGS.
- f. Drawer Sides and Backs: Thermoset decorative panels.
- g. Drawer Bottoms: Thermoset decorative panels.
3. Cabinet Style: Flush overlay.
4. Cabinet Doors and Drawer Fronts: Flush style.
5. Provide dust panels of 1/4 inch (6.4 mm) tempered hardboard above compartments and drawers, unless located directly under tops.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. General: Provide materials that comply with requirements of AWI/AWMAC/WI (AWS) for each type of woodwork and quality grade specified, unless otherwise indicated.
- C. Particleboard: ANSI A208.1; medium density industrial type as specified in AWI/AWMAC/WI (AWS), composed of wood chips bonded with interior grade adhesive under heat and pressure; sanded faces; Grade M-2; thickness as indicated.
 1. Use for concealed components.
 2. Use as backing for plastic laminate unless otherwise indicated.
- D. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC/WI (AWS); composed of wood fibers pressure bonded with interior grade adhesive to suit application; sanded faces; Grade MD; thickness as indicated.
 1. Use for concealed components.
 2. Use as backing for plastic laminate unless otherwise indicated.
- E. Softwood Plywood: PS 1, thickness as indicated, use where indicated.
- F. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
- G. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch (6 mm) thick, smooth two sides (S2S); use for dust panels and other components indicated on drawings.
- H. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed or semi-exposed portions of cabinetry adjacent to hardwood veneer.
 1. Thickness:.018 inch (.46 mm).

2.03 LAMINATE MATERIALS

- A. Manufacturers: Provide high pressure decorative laminates of one or combination of the following:
 1. Formica Corporation: www.formica.com.
 2. Panolam Industries International, Inc\Nevamar: www.nevamar.com.
 3. Wilsonart: www.wilsonart.com.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
 1. Color: White.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- D. Provide specific types as indicated.
 1. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, selected from manufacturer's full range of standard colors, matte finish.

2. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, selected from manufacturer's full range of standard colors, matte finish.
3. Laminate Backer BKL or Cabinet Liner CLS, 0.020 inch (0.51 mm) nominal thickness or thickness required by AWI/AWMAC/WI (AWS) standards, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; of width to match component thickness.
 1. Color: As selected by SJCF from manufacturer's full range.
 2. Thickness: 0.12 inch (3 mm).
- C. Adhesive for Bonding Edges: Hot-melt adhesive.
- D. Glass: Type A as specified in Section 08 80 00.
- E. Fasteners: Size and type to suit application.
- F. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- G. Anchors: Select material, type, size, and finish required by each substrate for secure anchorage. Provide hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or expansion sleeves for drilled-in-place anchors.
- H. Concealed Joint Fasteners: Threaded steel.

2.05 HARDWARE

- A. Hardware: BHMA A156.9, types as scheduled or indicated for quality grade specified.
 1. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - a. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, transparent finish, for nominal 1 inch (25 mm) spacing adjustments.
 1. Product: #282.12.405 5mm Diameter Transparent Shelf Support manufactured by Hafele or equal.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin chrome finish, 4 inch centers ("U" shaped wire pull, steel with chrome finish, 100 mm centers).
 1. Product: #116.39.464 manufactured by Hafele.
- D. Catches: Magnetic.
 1. Product: #592 manufactured by EPCO Sales, LLC.
 2. Provide where required or indicated on drawings
- E. Hinges: Concealed hinge with 120 degree opening and full overlay, one pair for each leaf minimum, additional hinges as required for size and weight of door per manufacturer's recommendations, use sex bolts on back to back installation on a single divider, self-closing type, metal hinge, nickel plated, black plastic cover caps, nickel-plated screws.
 1. Manufacturers:
 - a. Grass America Inc; Nexis Hinge System: www.grassusa.com/#sle.

- b. Blum, Inc; #71T5550 Hinge, Wing Base Plate and screws as recommended by manufacturer: www.blum.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Elbow Catch: Install on inactive leaf of pair of doors with lock or where indicated or where required.
- 1. Manufacturers:
 - a. Ives; Elbow Catch: www.ives.ingersollrand.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Pressure Catch: Install on doors or drawers where required or indicated.
- 1. Manufacturers:
 - a. Hafele; Pressure Catch, 8 kg pull, 245.50.301: www.hafele.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Door and Drawer Bumpers:
- 1. Manufacturers:
 - a. Hafele; Clear Plastic Door Bumper: www.hafele.com/us/.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units to the maximum extent possible and to permit passage through building openings.
- 1. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- D. Edges: Ease edges to radius indicated for the following:
- 1. Corners of cabinets and edges of solid wood (lumber) members less than 1 inch (1.6 mm) in nominal thickness: 1/16 inch (1.6 mm).
 - 2. Edges of rails and similar members more than 1 inch (25.4 mm) in nominal thickness: 1/8 inch (3.2 mm).
- E. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- F. Dovetail joints are not to be used for particle board construction.
- G. Shelving thickness as follows:
- 1. 3/4 inch (19 mm) to a maximum span of 32 inch (813 mm), unless noted otherwise.
 - 2. 1 inch (25.4 mm) for spans over 32 inch (813 mm).
- H. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
- 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed or semi-exposed plastic laminate finish edges with plastic trim.
- I. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

- J. Shop glaze glass materials using the Interior Dry method as specified in Section 08 80 00.

2.07 FINISHING

- A. General: The entire finish of interior architectural woodwork is specified in this section, regardless of whether factory applied or applied by others after installation.
- B. Factory Finishing: Apply the final finish to architectural woodwork at factory to the greatest extent possible before delivery. Limit job site finishing to a minimum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.
- C. Condition woodwork to average prevailing humidity conditions in installation areas before installing

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
 - 1. Refinish cut surfaces or repair damaged finish at cuts.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- H. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
- I. Maintain veneer sequence matching (if any) of cabinets with transparent finish.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.
- C. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- D. Touch up factory-applied finishes to restore damaged or soiled areas.

3.04 CLEANING AND PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that woodwork is being without damage or deterioration at time of Substantial Completion.

- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 84 00 - FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems 2015 (Reapproved 2019).
- D. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus 2020.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies 2013 (Reapproved 2017).
- F. ITS (DIR) - Directory of Listed Products Current Edition.
- G. FM (AG) - FM Approval Guide current edition.
- H. UL 1479 - Standard for Fire Tests of Penetration Firestops Current Edition, Including All Revisions.
- I. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems Current Edition, Including All Revisions.
- J. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Verification of minimum three years experience installing work of this type.
 - 2. Verification of at least five satisfactorily completed projects of comparable size and type.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Nelson FireStop Products: www.nelsonfirestop.com.
 - 5. Specified Technologies Inc: www.stifirestop.com/#sle.
 - 6. Nuco Inc.: www.nucoinc.com.
 - 7. Tremco Inc.: www.tremcosealants.com.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- C. Fire Ratings: See Code Plan and Drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
 - 1. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
- B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
- C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- D. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
- B. Fire Ratings: Use any system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
- C. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.
- D. Each trade is responsible for sizing and locating block-outs and the like for penetrations through construction. If such information is not furnished in a timely manner the trade shall be responsible for the cutting of required openings.
- E. Correlate sizes of openings shown on construction documents and verify their accuracy for the specific system or item(s) accommodated by them.
- F. Each trade whose work penetrates a fire-rated element shall seal the opening to assure fire and smoke stop meeting the fire rating.
- G. Extra, abandoned and oversize openings shall all be sealed. Where openings are abandoned they shall be filled with construction matching the adjacent work unless the area is protected by a permanent barrier preventing loading or traffic on the firestopped area.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

3.06 SCHEDULE

- A. Penetrations:
 - 1. Duct, cables, conduit, piping and all other penetrations through fire-resistance rated walls, vertical shafts, floors and roofs.
- B. Openings:

1. Cable trays and other openings through fire-resistance rated walls, floors or roofs.
 2. Wall opening protective materials around outlet boxes in the same stud cavity or within 24 inch (610 mm) of each other in fire-resistance rated walls.
- C. Top of Walls:
1. Top of wall and deck intersections of fire-resistance rated walls and shafts.
- D. Joints:
1. Joints in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 2. Joints in or between fire wall, fire barriers, fire partitions, smoke barriers, smoke partitions and shaft enclosures.
 3. The voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where fire-resistance-rated floors or floor/ceiling assemblies are required.
- E. Other locations where specifically shown on the drawings or where called for in other sections of the specification.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping: Firestopping sealants.
- B. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants 2017.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- F. ASTM C1311 - Standard Specification for Solvent Release Sealants 2022.
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- H. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).
- I. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2017).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 2. Bostik Inc: www.bostik-us.com.
 3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
 4. Hilti, Inc: www.us.hilti.com/#sle.
 5. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com/sle.
 6. Pecora Corporation: www.pecora.com.
 7. Tremco Global Sealants: www.tremcosealants.com.
 8. Sika Corporation: www.usa-sika.com.
 9. W.R. Meadows, Inc: www.wrmeadows.com/sle.
 10. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - 1) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - c. Joints between dissimilar materials; such as between tile and hollow metal or aluminum frames.
 - d. Voids created at the intersection of exterior curtain wall assemblies and nonfire-resistance rated floor or floor/ceiling assemblies to retard the interior spread of fire and hot gases between stories.
 - e. Other joints indicated below.
 2. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.
- B. Type of Joint

1. Designations: The number Type refer to the product to be used, listed in Sealants below.
2. Interior Joints:
 - a. Seal interior perimeters of exterior opening frames.
Type: 3, 4, 5, 7.
 - b. Control and expansion joints open or soft joints in masonry under steel support members on the interior of exterior poured-in-place concrete.
Type: 3, 4, 5.
 - c. Control and expansion joints on the interior of exterior surfaces of exposed unit masonry walls and architectural wall panels.
Type: 3, 4, 5.
 - d. Interior control and expansion joints in floor surfaces.
Type: 8, 9, Preformed Joint Seals.
 - e. Perimeters of interior frames in masonry walls.
Type: 3, 4, 5.
 - f. Interior at floor/wall intersection of brick or burnished block and resilient flooring where there is no applied base.
Type: 4, 5.
 - g. Interior masonry vertical control joints and intersections of masonry and other walls.
Type: 3, 4, 5.
 - h. Joints at tops of non-load bearing masonry walls at the underside of construction above.
Type: 5, 7, 8.
 - i. Perimeter of plumbing fixtures where they abut walls, counters and floors.
Type: 3.
 - j. Joints of counters and backsplashes where they abut walls.
Type: 3, 7.
 - k. Joints where gypsum board partitions abut walls and floors of same or dissimilar materials.
Type: 3, 4, 5.
 - l. Joints where gypsum board ceilings abut masonry walls. Where liquid tile finish is used, caulk joints after liquid tile is in place using color to match painted finish.
Type: 3, 4, 5.
 - m. One inch 1 inch (25.4 mm) expansion joints shall be two part non-sag at vertical joints.
Type: 4, 5.
 - n. One inch 1 inch (25.4 mm) expansion joints shall be two part self-leveling at horizontal joints.
Type: 8.
- C. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177-2600.
- C. As selected by Architect from manufacturer's standard colors. In general, colors will be selected to match or be slightly darker than the adjacent material(s).

2.04 NONSAG JOINT SEALANTS

- A. Designations: The number Type refer to the work to be caulked in Joint Sealant Applications above.
- B. Type 1 - Acoustical Sealant:
 - 1. Specified in Section 09 21 16 - Gypsum Board Assemblies.
- C. Type 2 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Manufacturers:
 - a. Dow Corning Corporation; 790 Silicone Building Sealant: www.dowcorning.com/construction/#sle.
 - b. Pecora Corporation; 864NST Low Modulus Architectural Silicone Sealant: www.pecora.com.
 - c. Momentive Performance Materials, Inc (GE Silicones products); SCS2700 Silpruf LM: www.momentive.com.
 - d. Tremco Global Sealants; Spectrem 3: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Type 3 - Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Manufacturers:
 - a. Dow Corning Corporation; 791: www.dowcorning.com/construction/sle.
 - b. Pecora Corporation; 860: www.pecora.com.
 - c. Momentive Performance Materials, Inc (GE Silicones products); SCS2800 Silglaze II: www.momentive.com.
 - d. Tremco Global Sealants; Spectrem 2: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Type 4 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: To be selected by SJCF from manufacturer's standard range.
 - 3. Manufacturers:
 - a. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
 - b. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com/#sle.
 - c. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.
 - d. Tremco Building Solutions; Dymeric 240FC: www.tremcosealants.com.
 - e. MasterSeal; NP2: www.master-builders-solutions.basf.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Type 5 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent.
 - 2. Color: To be selected by SJCF from manufacturer's standard range.
 - 3. Products:
 - a. Pecora Corporation; DynaTrol I-XL General Purpose One Part Polyurethane Sealant: www.pecora.com.

- b. MasterSeal; NP1: www.master-builders-solutions.basf.com.
 - c. Tremco Building Solutions; Dymonic FC: www.tremcosealants.com.
 - d. Sika Corp.; Sikaflex 1A: www.sikacorp.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Type 7 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
- 1. Color: To be selected by SJCF from manufacturer's standard range.
 - 2. Manufacturers:
 - a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
 - b. Tremco Global Sealants; Tremflex 834: www.tremcosealants.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.

- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION

SECTION 09 05 61 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in contract documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Sheet carpeting.
 - 3. Carpet tile.
- B. Removal of existing floor coverings.
- C. General Contractor: Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Patching compound.
- F. Remedial floor coatings.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.
- D. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings 2011.

1.03 SUBMITTALS

- A. Visual Observation Report: For existing floor coverings to be removed.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- C. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Submit report not more than two business days after conclusion of testing.

1.04 QUALITY ASSURANCE

- A. General Contractor may perform adhesive and bond test with General Contractor's own personnel or hire a testing agency.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Rated for use interior and exterior.
 - 3. Calcium aluminate content; gypsum content is prohibited.
 - 4. Products:
 - a. Mapei; Mapecem QuickPatch: www.mapei.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Floor Leveling Compound:
 - 1. Hydraulic-cement-based, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Rated for use interior and exterior.
 - 3. Not affected by exposure to intermittent rain, 6 hours after install.
 - 4. Not affected by freezing temperatures, 3 days after install.
 - 5. Products:
 - a. Mapei; Ultraplan Extreme 2: www.mapei.com.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Remedial Floor Coating (Apply under Vinyl or Rubber Floor): Single- or multi-layer coating or coating/overlay combination.
 - 1. Moisture control for slabs with moisture vapor emission rates (MVERs) up to 15 lbs (6.8 kg) and relative humidity (RH) up to 99% per ASTM F2170.
 - 2. Alkalinity protection for slabs up to pH of 12.
 - 3. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 4. Products:
 - a. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier: www.custombuildingproducts.com/#sle.
 - b. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com/#sle.
 - c. Proflex Products, Inc; MS 225: www.proflex.us.
 - d. TEC, an H.B. Fuller Construction Products Brand; TEC LiquiDam EZ with TEC Level Set 200 SLU: www.tecspecialty.com/#sle.
 - e. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.
 - f. Mapei; Planiseal MSP: www.mapei.com.
 - g. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
 - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
 - b. Removal of existing floor covering.
 - 2. Preliminary cleaning.
 - 3. Moisture vapor emission tests; one in the first 1000 square feet (100 square meters) and one test in each additional 20,000 square feet (1,858 square meters), unless otherwise indicated or required by flooring manufacturer.
 - 4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 6. Specified remediation, if required.
 - 7. Patching, smoothing, and leveling, as required.
- B. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Test in accordance with ASTM F1869 and as follows.
- C. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Test in accordance with ASTM F2170 Procedure A and as follows.
- C. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the General Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

3.07 PREPARATION

- A. **General Contractor to prepare the sub-floor under Carpet and Tile Carpeting as follows:**
 - 1. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
 - 2. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
 - 3. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
 - 4. Vacuum clean substrate.
- B. **General Contractor to prepare the sub-floor under Resilient Flooring as follows:**
 - 1. Inspect the slab with a 10 feet (3 m) straight edge in two directions. Fill low spots greater than 3/16 inch (4.7 mm) with sub-floor filler. Remove high spots greater than 3/16 inch (4.7 mm).
 - 2. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
 - 3. Scrape and sand the floor with #12 grit sand paper.
 - 4. Fill holes, chips and imperfections with sub-floor filler.
 - 5. Sand the floor again.
 - 6. Skim the floor with floor patch.
 - 7. Sand the floor again.
 - 8. Fill holes, chips and imperfections with sub-floor filler.
 - 9. **Floor installer to prepare the sub-floor surface after the General Contractor work is complete and as follows:**
 - a. Sand the floor.
 - b. Fill holes, chips and imperfections with sub-floor filler.
 - c. Vacuum clean substrate.
- C. See individual floor covering section(s) for additional requirements.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.
- B. Apply coating under vinyl or rubber flooring.

END OF SECTION

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
- C. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

- A. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing 2020.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.
- D. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2022.
- J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2022.
- K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- L. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.
- M. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel 2017.
- N. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2022.
- O. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- P. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels 2019.

- Q. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels 2019, with Editorial Revision (2020).
- R. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- S. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- T. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- U. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- V. ASTM E413 - Classification for Rating Sound Insulation 2022.
- W. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- X. GA-226 - Application of Gypsum Board to Form Curved Surfaces 2019.
- Y. GA-600 - Fire Resistance and Sound Control Design Manual 2021.
- Z. ITS (DIR) - Directory of Listed Products Current Edition.
- AA. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum three years of experience.
- B. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by, and displaying a classification label from, an independent testing agency acceptable to the authority having jurisdiction.
 - 1. Construct fire-resistance rated partitions in compliance with tested assembly requirements indicated on drawings and the code plan.

1.06 DELIVERY, STORAGE AND PROTECTION

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.
- B. Protect metal corner beads and trim from being bent or damaged.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies as indicated on the drawings and the code plan.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com/#sle.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 4. The Steel Network: www.steelnetwork.com.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 - 1. Coatings: Comply with ASTM C645 or AISI S220; roll-formed from hot-dipped galvanized steel; complying with ASTM A1003/A1003M and ASTM A653/A653M G40 (Z 120) or G40EQ tested according to ASTM B117 Salt Spray Test at a minimum of 120 hours. A40 Galvannealed coatings and G40e coatings are not allowed.
 - a. In wet areas: The walls enclosing shower areas/locker rooms, kitchens; Comply with ASTM C645 roll-formed from hot-dipped galvanized steel; complying with ASTM A1003/A1003M and ASTM A653/A653M G60 (Z 180). A60 Galvannealed coatings and G60e coatings are not allowed.
 - 2. Minimum Base-Metal Thickness:
 - a. Steel Studs and Runners:
 - 1) 25 gauge 0.0179 inch (0.455 mm), except 20 gauge 0.0329 inch (0.836 mm) for door and window jambs.
- C. Studs: "C" shaped with flat or formed webs with knurled faces.
- D. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
- E. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 4. National Gypsum Company: www.nationalgypsum.com.
 5. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces, soffits, ceilings, soffits, and soffits, unless otherwise indicated.
 2. Type: Fire-resistance rated Type X, UL (DIR) or ITS (DIR) listed.
 3. Thickness:
 - a. Vertical Surfaces: As scheduled or if not scheduled 5/8 inch (16 mm).
 - b. Ceilings: As scheduled or of not scheduled 5/8 inch (16 mm).
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 4. Edges: Tapered.
- C. Impact Resistant Wallboard:
1. Application: High-traffic areas indicated.
 2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
 3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 4. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
 5. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
 6. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 7. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
 8. Unfaced Type: Interior fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M.
 9. Type: Fire resistance rated Type X, UL (DIR) or ITS (DIR) listed.
 10. Thickness: 5/8 inch (16 mm).
 11. Edges: Tapered.
- D. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) wide, beveled long edges, ends square cut.
1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.

2.04 ACCESSORIES

- A. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
1. Products:
 - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
 - b. Tremco Acoustical Sealant; Tremco Inc.: www.tremcosealants.com.
 - c. Sheetrock Brand Acoustical Sealant; USG Corporation: www.usg.com.
 - d. SCS-100; ITW TACC: www.itwacc.com.
 - e. AC-20 FTR; Pecora Corporation: www.pecora.com.
- B. Finishing Accessories: ASTM C1047, galvanized steel, unless noted otherwise.

1. Types: As detailed or required for finished appearance.
 2. Special Shapes: In addition to conventional corner bead and control joints, provide L-bead at exposed panel edges.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners.
 2. Ready-mixed vinyl-based joint compound.
 3. Chemical hardening type compound.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- F. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 PREPARATION

- A. Applied Fireproofing: Before applied fireproofing materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed applied fireproofing materials. Where offset anchor plates are required, provide continuous plates fastened to building structure. Do not reduce thickness of applied fireproofing materials below that required for fire-resistance ratings indicated. Protect adjacent applied fireproofing materials from damage.
- B. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

3.03 GENERAL

- A. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- B. Do not bridge building expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- C. Install bracing at terminations in assemblies.

3.04 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as scheduled.
1. Extend partition framing to above ceiling or to deck where scheduled.
 2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
 3. Install runner tracks at floors, ceilings, tops of walls, and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.

4. Laterally brace top of studs at 4 foot (1.2 m) o.c. if partition does not extend to overhead structure.
 5. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
 6. Construct framing around plumbing fixture carriers spacing studs as necessary to fit and maintain structural integrity of the studs.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
1. Erect framing for door and sidelight frames plumb.
 2. Frame openings with minimum base-metal thickness of 0.033 inch (0.838 mm) for double jambs and head.
 3. Frame duct and similar openings to within 1/4 inch (6.3 mm) of required size allowing for isolation between framing and penetrating member.
- D. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive furring and gypsum board, not more than 4 inches (100 mm) from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches (600 mm) on center.
1. Orientation: Horizontal.
 2. Spacing: At 16 inches on center (At 400 mm on center).
 3. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.05 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions. Install where acoustic walls are scheduled.
1. Place one bead continuously on substrate before installation of perimeter framing members.
 2. Place continuous bead at perimeter of each layer of gypsum board.
 3. Seal around all penetrations by conduit, pipe, ducts, rough-in boxes, and control and expansion joints, except where firestopping is provided.
 - a. Apply at least 1/8 inch (3.1 mm) coating of acoustic sealant on sides and back of rough-in boxes.
 - b. Acoustic sealant work includes sealing above acoustical ceilings.
 - c. Install acoustical sealant at both faces of partitions at penetrations.

3.06 BOARD INSTALLATION

- A. Comply with ASTM C840 and GA-216. Install to minimize butt end joints, especially in highly visible locations.
1. Do not place tapered edges against cut edges or ends.
 2. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) open space between boards. Do not force into place.
 3. Attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.
 4. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4 inch (6.3 mm) space and trim edge with L-type edge trim. Seal joints with acoustical sealant at sound-rated walls and where indicated.

5. Fit board to ducts, pipes, outlets, etc., which are penetrating wallboard. Seal joints with acoustical sealant at sound-rated walls and where indicated.
- B. Single-Layer Non-Rated: Install gypsum board vertically, with ends and edges occurring over firm bearing.
 1. At tall and narrow walls, install boards horizontally with end joints minimal and staggered over studs to minimize joints.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11> ANSI A108/A118/A136.1 and manufacturer's instructions.
- F. Installation on Framing: Use screws for attachment of all gypsum board .
 1. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.
- G. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.07 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials, would otherwise be exposed or not covered with other trim.

3.08 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed or powder-type vinyl-based joint compound and finished with ready-mixed or powder-type vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 2. Level 2: Behind cabinetry, and on backing board to receive tile finish.
 3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 3. Taping, filling and sanding is not required at base layer of double layer applications.

3.09 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.10 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- B. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2022.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2019.
- D. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements 2022.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2022.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2019.
- G. UL (FRD) - Fire Resistance Directory Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two samples 6 by 6 inch (152 by 152 mm) in size illustrating material and finish of acoustical units.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Provide 12 units of each type of acoustical tile used at date of Substantial Completion.

1.05 QUALITY ASSURANCE

- A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

- B. Prior to the start of installation, all exterior windows and doors are to be in place, glazed and weather-stripped. The roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry. Mechanical, electrical and other utility service work installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG: www.usg.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
 - 1. Armstrong World Industries, Inc: www.armstrong.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
Rockfon, LLC: www.rockfon.com/#sle.
 - 3. USG: www.usg.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
 - 1. Units for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly as part of suspension system.
- B. Acoustical Panels Type A9: Painted mineral fiber, ASTM E 1264 Type III, with the following characteristics:
 - 1. Size: 24 x 24 inches (600 x 600 mm).
 - 2. Thickness: [_____] inches ([_____] mm).
 - 3. Fire Rating Assembly: Non-rated.
 - 4. NRC Range: [_____] to [_____] , determined as specified in ASTM E1264.
 - 5. Ceiling Attenuation Class (CAC): [_____] , determined as specified in ASTM E1264.
 - 6. Edge: Reveal edge.
 - 7. Surface Color: White.
 - 8. Basis of Design: match existing.
 - a. Substitutions: Not allowed.

2.03 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
 - 1. High Humidity Finish: Provide G-60 Hot dipped galvanized with aluminum capped members at kitchens, locker rooms, shower rooms, and where Type A3 and A4 panels are used.
 - 2. Provide and install curved or segmented and curved wall angles at radius walls and round or radius columns.
 - 3. Provide and install trimable corner pieces to match bullnose profile at radius wall corners.
 - 4. Entry Vestibules: Provide and install hold down clips and access clips.
 - 5. Fire Rating: Provide and install hold down clips and access clips where system requires them for fire rating.

- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty.
 - 1. Profile: Tee; 15/16 inch (24 mm) wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E1190, conducted by a qualified testing and inspecting agency.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C635/C635M, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 12 gauge, 0.08 inch (2.05 mm) diameter wire.
 - 3. At Indoor Swimming Pools and at Aluminum Suspension Systems: Nickel-Copper alloy wire, 12 gauge, 0.08 inch (2.05 mm) diameter wire; epoxy coated concrete deck fasteners; tape between wire and aluminum grid to prevent galvanic action of dissimilar materials.
 - a. Manufacturer:
 - 1) Special Metals Corporation; Monel alloy 400: www.specialmetals.com.
 - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- D. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- E. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M for sites with Seismic Design Category A or B and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected ceiling plan or lighting layout.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap corners.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Attachment of hangers:
 - 1. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Turns shall be within 3 inch (76.2 mm) at ends. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - a. Each hanger connection into substrate to carry 100 lb (45.35 kg) load.
 - b. **Do not support ceilings directly from permanent metal forms or steel floor deck.** Fasten hangers to structural members, cast-in-place hanger inserts, postinstalled mechanical anchors, or power-actuated fasteners that extend through forms into concrete.
 - c. **Do not support ceiling directly from steel roof deck.** Attach hangers to structural members.
 - 2. 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 structure to which hangers are attached and 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.
- H. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental framing support for attachment of hanger wires.
- I. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental framing members and hangers in form of trapezes or equivalent devices.
- J. Suspension Wire:
 - 1. Suspension wire shall not hang more than one in six out of plumb unless a countersloping wire or horizontal bracing is provided. Suspension wires should not press against ducts or pipes.
 - 2. Local kinks or bends shall not be made in hanger wires as a means of leveling carrying channels or main runners.

- K. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- L. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
- M. Do not eccentrically load system or induce rotation of runners.
- N. Install light fixture boxes constructed of acoustical panel above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.05 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.
- B. Installation accessories.

1.02 REFERENCE STANDARDS

- A. AIA A305 - Contractor's Qualification Statement 2020.
- B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile 2004 (Reapproved 2018).
- C. ASTM F1861 - Standard Specification for Resilient Wall Base 2021.
- D. ASTM F2169 - Standard Specification for Resilient Stair Treads 2015 (Reapproved 2020).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for SJCF's initial selection.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.
- B. Installers: Company specializing in installing the types of products specified in this section, with minimum 5 years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Burke Flooring: www.burkeflooring.com/#sle.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - c. Roppe Corp: www.roppe.com.

- d. Flexco, Inc.: www.flexcofloors.com.
- e. Substitutions: See Section 01 60 00 - Product Requirements.
2. Height: 4 inch (100 mm).
3. Thickness: 0.125 inch (3.2 mm).
4. Finish: Satin.
5. Length: Roll.
6. Color: To be selected by SJCF from manufacturer's full range.
7. Accessories: Premolded external corners where the return is less than 6 inch (152 mm).

2.02 ACCESSORIES

- A. Adhesive for Vinyl and Rubber Flooring:
 1. Suitable for slabs with moisture vapor emission rates (MVERs) up to 8 lbs per 8 sq. ft. (3.63 kg per 3.63 m squared) per 24 hours and 90% relative humidity.
 2. Manufacturers:
 - a. Stauf USA, LLC; D737 High-Tack: www.staufusa.com/#sle.
 - b. TEC, an H.B. Fuller Construction Products Brand; TEC Roll Fast Vinyl Flooring Adhesive: www.tecspecialty.com/#sle.
 - c. Mapei; Ultrabond ECO 711: www.mapei.com.
 - d. Substitutions: Section 01 6000 - Product Requirements.
- B. Moldings, Transition and Edge Strips: Rubber or vinyl.
 1. Install at the following locations:
 - a. Molding between carpet and access flooring - Johnsonite CD-XX-B or equal.
 - b. Others where detailed or required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- B. Verify that required floor-mounted utilities are in correct location.

3.02 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 1. Spread only enough adhesive to permit installation of materials before initial set.
 2. Fit joints and butt seams tightly.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 1. Resilient Strips: Attach to substrate using adhesive.
- F. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.03 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

- B. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.05 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Removal of existing carpet tile.
- C. Accessories

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- D. CRI 104 - Standard for Installation of Commercial Carpet 2015.
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Maintenance Data for Closeout Submittals: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: 20 sq ft (1.8 sq m) of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install carpet until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain 65 to 90 deg F (18 to 32 deg C) ambient temperature with a maximum relative humidity of 65%, 48 hours prior to, during and 72 hours after installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The following carpet product is approved:
- B. Carpet Tile: Scheduled CPT-1
 - 1. Product: Multiplexer manufactured by Mannington Commercial.
 - 2. Size: 24 inch x 24 inch
 - 3. Color: Cybernetic.
 - 4. Installation Pattern: Vertical Ashlar. Set parallel to building lines.

2.02 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Molding and Edge Strips: Rubber or vinyl, color as selected.
 - 1. Install at the following locations:
 - a. Edge between carpet and exposed concrete - Johnsonite EG-XX-K or equal.
 - b. Molding between carpet and resilient tile - Johnsonite CD-XX-B or equal
 - c. Stair nosing with visually impaired strip with carpet at radius stairs/risers- Johnsonite VIVCD-XX or equal.
 - d. Stair nosing with visually impaired strip with carpet at straight stairs/risers - Johnsonite VIRCN-XX-A or equal.
 - e. Others where detailed or required.
- C. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.
 - 1. Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
 - 1. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove existing carpet tile.
- B. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI 104 (Commercial).
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Maintain dye lot integrity. Do not mix dye lots in same room or space.
- E. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Remove and dispose of debris and unusable scraps.
- C. Replace carpet where damaged, flawed and can't be cleaned satisfactorily.
- D. Remove yarns that protrude from carpet surface.
- E. Clean and vacuum carpet surfaces.
- F. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period.

END OF SECTION

SECTION 09 69 00 - ACCESS FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adjustable height access flooring systems.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Grounding and bonding of access floor system to building grounding system.
- B. Section 26 27 26 - Wiring Devices: Access floor boxes.
- C. Section 28 46 00 - Fire Detection and Alarm: Underfloor smoke detection system.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM E2322 - Standard Test Method for Conducting Transverse and Concentrated Load Tests on Panels used in Floor and Roof Construction 2003 (Reapproved 2015).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- E. CISCA (AF) - Recommended Test Procedures for Access Floors 2016.
- F. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. NFPA 75 - Standard for the Fire Protection of Information Technology Equipment 2020.
- J. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets including loading capacities, materials, finishes, dimensions of components, profiles, and accessories.
- C. Shop Drawings: Indicate floor layout, appurtenances or interruptions, edge details, ramps.
- D. Samples: Submit two samples of floor grid and panel, [12 inch] by [12 inch] inch ([_____] by [_____] mm) in size illustrating finish.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention , and [_____].
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Materials: Supply an additional (1) one percent of access flooring system components.
3. Panel Lifting Devices: One, of manufacturer's standard type.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work required in this section and approved by access flooring manufacturer.

1.07 MOCK-UP

- A. Construct access flooring system mock-up, six feet ([_____] m) long by six feet ([_____] m) wide, showing specified components and accessories.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Access Flooring - Adjustable Height:
 1. ASM Modular Systems, Inc; [____]: www.asmproducts.com/#sle.
 2. Global IFS; [____]: www.globalIFS.com/#sle.
 3. Tate Access Floors, Inc; [____]: www.tateaccessfloors.com/#sle.
 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 Performance REQUIREMENTS

- A. General: Comply with the following system requirements and as indicated for specified components.
- B. Concentrated Load: Over an area of 1 inch by 1 inch (25 mm by 25 mm), 1250 pounds (567 kg) at any location, when tested in accordance with CISCA (AF).
- C. Ultimate Load: Over an area of 1 inch by 1 inch (25 mm by 25 mm): Not less than twice design load or 2500 pounds (1134 kg), when tested in accordance with CISCA (AF).
- D. Rolling Loads: Permanent deformation not to exceed 0.04 inch (1 mm), when tested in accordance with CISCA (AF).
 1. Wheel A: 10 passes, with loading of 400 pounds (81 kg).
 2. Wheel B: 10,000 passes, with loading of 400 pounds (81 kg).
- E. Drop Impact Load: 100 pounds (45.5 kg), when tested in accordance with CISCA (AF).
- F. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 75, maximum; when tested in accordance with ASTM E84.
- G. Electrical Grounding Connection: Listed and classified by Underwriters Laboratories as suitable for the purpose specified and indicated. Connect to grounding grid per manufacturer's requirements.

2.03 ACCESS FLOORING - ADJUSTABLE HEIGHT

- A. Factory-fabricated system consisting of removable floor panels and supporting understructure that allows access to space below floor without requiring removal of panels other than the one directly above the space to which access is needed; provide components and accessories required for complete installation.

- B. Finished Floor Elevation: Top of access floor [4", 8", 18"] inches ([_____] mm) nominal height above building structural floor as indicated on drawings.
- C. Configuration:
 - 1. Lay-in panels on stringerless understructure.
- D. Components:
 - 1. Pedestal Assembly:
 - a. Material: Steel.
 - b. Base: Manufacturer's standard shape and size in accordance with system performance requirements.
 - c. Column: Threaded supporting rod to permit 1-1/2 inch (38 mm) adjustment.
 - 2. Stringers: Steel channels, box, or tee sections.
 - 3. Floor Panels:
 - a. Construction:
 - 1) Concrete core laminated with sheet steel plates.
 - b. Factory-Applied Finish: HPL Formica "Waxed Maple" or equal faux wood laminate.

2.04 ACCESSORIES - Adjustable HEIGHT

- A. Fascia Panels:
 - 1. 16 ga aluminum sheet.
 - 2. Accessories: Include corner pieces, trim, reinforcing, and clip angles.
- B. Ramps: Same materials, structural strength, and construction as floor panels; flush extruded aluminum cover plates at junction with floor system.
 - 1. Ramp Surface: carpet tile, ref spec.
- C. Railings: Posts and rails of extruded aluminum; assembled with sleeved connections; cast metal end caps, floor sockets, collars, brackets, and fittings.

2.05 Fabrication

- A. Fabrication Tolerances:
 - 1. Floor Panel Flatness: Plus or minus 0.02 inch (0.5 mm) in any direction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements are as indicated on shop drawings.
- B. Verify that substrates comply with tolerances, dimensioned clearances, and other requirements specified in other sections, and that substrates are clean, dry, and free of conditions and deleterious substances that might interfere with system installation.
- C. Verify that required utilities are available, in proper location, and are ready for use.
- D. Start of installation constitutes acceptance of project conditions.

3.02 PREPARATION

- A. Vacuum clean substrate surfaces.

3.03 INSTALLATION - Adjustable HEIGHT ACCESS FLOORING

- A. Install components in accordance with manufacturer's instructions.
- B. Secure pedestal base plate to subfloor with adhesive.
- C. Install additional pedestals where grid pattern is interrupted by room appurtenances or at cut-outs.
- D. Close field cut floor panels with edge trim.

- E. Cut holes in floor panels to accommodate Owner equipment as indicated on drawings. Provide cable cut-out protection.
- F. Provide positive electrical earth grounding of entire floor assembly in accordance with NFPA 75.
- G. Fascia Panels:
 - 1. Install fascia panels at exposed sides.
 - 2. Secure panels to clip angles attached to structural floor and edge of floor panels.
 - 3. Install metal trim at intersection of fascia panels and access floor and at abutting walls and columns.
- H. Railings:
 - 1. Extend railing posts through floor panels to structural floor; secure to flange fittings anchored to structural floor.
 - 2. Brace posts in position at floor panels with floor collar retainers.
 - 3. Electrically ground railings to floor system.

3.04 TOLERANCES

- A. Maximum Out of Level Floor Panel Tolerance: 1/16 inch in 10 ft (1.6 mm in 3 m), non-cumulative.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

3.06 ADJUSTING

- A. Adjust pedestals to achieve a level floor and to assure adjacent floor panel surfaces are flush.

3.07 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.08 PROTECTION

- A. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated including the following:
 - 1. General: Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. If not designated, match adjacent painted surface; if not in a painted surface, in general match trim color.
 - 2. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 3. Elevator pit ladders.
 - 4. Exposed surfaces of steel lintels and ledge angles.
 - 5. Cementitious wood fiber acoustical panels.
 - 6. Auditoriums: Dry fog/fall all areas above the clouds black. Paint the clouds. Dry fog/fall the stage structure/deck black.
 - 7. At glued-laminated construction, paint exposed steel connections, brackets and bolts.
 - 8. Prime surfaces to receive wall coverings and digitally printed wall coverings.
 - 9. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, grilles registers and louvers which are not already factory pre-finished, conduit, grilles registers and louvers which are not already factory pre-finished, boxes, grilles registers and louvers which are not already factory pre-finished, insulated and exposed ducts, grilles registers and louvers which are not already factory pre-finished, hangers brackets collars and supports, grilles registers and louvers which are not already factory pre-finished, mechanical equipment, grilles registers and louvers which are not already factory pre-finished, electrical equipment, grilles registers and louvers which are not already factory pre-finished, and grilles registers and louvers which are not already factory pre-finished, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - 10. Mechanical, electrical, utility and custodial spaces: Walls and ceilings or structure, as applicable, be finish painted where visible from normal level viewing. In this situation paint pipe, conduit fittings, accessories, etc., mounted at surfaces or within structure to be painted (more easily painted than masked out). Painting of ducts is required. Painting of piping, conduit, fittings, accessories, etc., positioned away from painted surfaces (not requiring masking to prevent being painted) is not required.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Unless otherwise indicated, shop priming of ferrous metal items and fabricated components are included under their respective trades.
 - 3. Items indicated to receive other finishes.
 - 4. Items indicated to remain unfinished.
 - 5. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.

6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
7. Marble, granite, slate, and other natural stones.
8. Floors, unless specifically indicated.
9. Ceramic and other tiles.
10. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
11. Glass.
12. Concrete masonry units in utility, mechanical, and electrical spaces.
13. Acoustical materials, unless specifically indicated.
14. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 09 91 13 - Exterior Painting.
- C. Section 09 96 00 - High-Performance Coatings.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1 2016.
- E. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2 2021.
- F. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- G. SSPC-SP 2 - Hand Tool Cleaning 2018.
- H. SSPC-SP 3 - Power Tool Cleaning 2018.
- I. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- J. SSPC-SP 13 - Surface Preparation of Concrete 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples for Initial Selection: For each type of topcoat product indicated.
 1. Color schedules will be furnished to General Contractor, by SJCF, before application of prime coats.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.

- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.06 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
- C. Apply benchmark samples after permanent lighting and other environmental services have been activated.
- D. Locate where directed by Architect.
- E. Final approval of color selections will be based on benchmark samples.
 - 1. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by SJCF at no added cost to Owner.
- F. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible, for interior/exterior paints.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by SJCF is obtained using the specified procedures for substitutions.
- B. Paint "Series" are intended to specify type and quality of a paint line which includes white and tint bases. Contractor shall use proper base for color(s) selected including accent colors.
- C. Paints:
 - 1. Base Manufacturer: Sherwin-Williams Company: www.sherwin-williams.com/#sle.

2. Other acceptable manufacturers equal first line products may be submitted after bidding and shall be subject to SJCF approval:
 3. PPG Paints: www.ppgpaints.com/#sle.
 4. Glidden Professional: www.glidden.com.
 5. Tnemec Inc.: www.tnemec.com.
 6. Benjamin Moore & Co.: www.benjaminmoore.com.
 7. Coronado Paint: www.coronadopaint.com.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide 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.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by SJCF after award of contract.

2.03 PAINT SYSTEMS - INTERIOR

- A. Galvanized Metal and Aluminum (Semi-Gloss)
1. Preparation: Wash with denatured alcohol or simple green. No mineral spirits are to be used.
 2. Primer Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66W1310 Series (5-10 mils wet, 2-4 mils dry).
 3. First Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-600 Series.
 4. Final Coat: S-W Pro Industrial Acrylic Semi-Gloss, B66-600 Series (6 mils wet, 2.1 mils dry per coat).
- B. Plaster or Drywall/Gypsum Board (Eg-Shel)
1. Preparation: Brush or wipe sand finish plaster surfaces to remove lightly bonded sand particles before painting.
 2. Primer Coat: S-W ProMar Zero VOC Latex Primer, B28W2600 (4 mils wet, 1 mils dry).
 3. First Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.

4. Final Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Loose dirt, foreign matter, brushed or scraped off, leaving surface clean and dry before painting.
- C. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- E. If substrate preparation is the responsibility of another installer, notify SJCF of unsatisfactory preparation before proceeding.
- F. Test shop-applied primer for compatibility with subsequent cover materials.
- G. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Clean dust, dirt, and debris from rooms before interior painting.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Remove or repair existing paints or finishes that exhibit surface defects.
- E. Preparation of previously painted surfaces:
 1. Loose surface materials - scrape and brush well. Sand surface feathering edges.
 2. Oily films, clean with thinner and/or as specified for mildew.
 3. Dull high gloss surfaces.
 4. Remove wax with commercial stripping product.
 5. Rust and corrosion - sand or brush to clean metal.
 6. Apply primer to repaired or bare areas and finish as specified in paint systems. Apply only finish coat on solid painted surfaces.
 7. Paint entire surface from interior corner to interior corner where remodeling work causes patching or revision in the painted surfaces.
- F. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

- G. Seal surfaces that might cause bleed through or staining of topcoat.
- H. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- I. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
 - 3. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- J. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.
 - 3. Do not paint surfaces if moisture content to be painted exceeds that permitted in manufacturer's written instructions.
- K. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- L. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- M. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- N. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- O. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- P. Copper: Remove contamination by steam, high pressure water, or solvent washing.
- Q. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- R. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- S. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- T. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- U. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.
 - 1. Paint top and bottom of doors same as face and edges. Paint exterior doors same inside and out with exterior paint system.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Unless specified otherwise, apply paint with brush, spray, or roller as recommended by manufacturer to recommended thickness minimum. **Use a spray or roller application on hollow metal doors and door/window frames for a brushless finish.**
- C. Apply products in accordance with manufacturer's written instructions.
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
 - 1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- H. Sand wood and metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by SJCF, and leave in an undamaged condition.
- C. Touch-up damaged finishes after Substantial Completion.

3.06 COLOR SCHEDULE

- A. In general: Corridors will be painted a different color than rooms.
- B. Accent Paint: Accent colors will be selected for exposed steel structure, exposed ducts, hollow metal door frames, hand rails and guardrails.
- C. Soffits: Accent colors will be selected for exposed soffits. The vertical surface will be painted a different color than the horizontal surface.
- D. Walls: Accent colors will be selected for select walls in the corridors.

- E. Gymnasiums: Accent bands will be included. Figure two bands 24 inches (610 mm) wide around the perimeter of the room.

END OF SECTION

21 13 00 FIRE-SUPPRESSION SPRINKLERS

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

The existing sprinkler system is to be modified in the area of remodel to provide additional sprinkler heads as required for coverage and relocation of sprinkler heads for new ceiling layout.

This Section includes fire-suppression sprinklers, piping, and equipment for the following building systems:

- A. Dry-pipe, fire-suppression sprinklers, including piping, valves, specialties, automatic sprinklers, air compressor, and accessories.

Related Sections include the following:

- A. Division 26 Section "Fire Alarm Systems" for alarm devices not in this Section.

DEFINITIONS:

Working Plans: Documents, including drawings showing pipe routing, pipe sizing, pipe elevations, sprinkler head types, sprinkler head locations, specialty valves, hydraulic calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction. Coordinate components with other building trades to avoid conflicts with other building components and with the Architect/Engineer.

SYSTEM PERFORMANCE REQUIREMENTS:

Design sprinkler system, obtain approval from authorities having jurisdiction, and obtain approval of the Architect/Engineer.

Design sprinkler system according to the following and obtain approval from authorities having jurisdiction:

- A. Include 10 percent margin of safety for available water flow and pressure.
- B. Include losses through water-service piping, valves, and backflow preventers.
- C. Sprinkler Occupancy Hazard Classifications: As follows:
 - 1. Office and Public Areas: Light Hazard.
- E. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
 - 1. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (6.3 mL/s over 139-sq. m) area.
 - 2. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. (12.6 mL/s over 139-sq. m) area.
- F. Maximum Protection Area per Sprinkler: As follows:
 - 1. Office Space: 225 sq. ft. (20.9 sq. m).

2. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.

Components and Installation: Capable of producing piping systems with 175-psig (1200-kPa) minimum working-pressure rating, unless otherwise indicated.

SUBMITTALS:

Product Data: For the following:

- A. Pipe and fitting materials and methods of joining for sprinkler piping.
- B. Pipe hangers and supports.
- C. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.

Fire-Hydrant Flow Test Report: As specified in "Preparation" Article.

Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations.

Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

Maintenance Data: For each type of sprinkler specialty to include in maintenance manuals specified in Division 1.

QUALITY ASSURANCE:

Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval from the Architect/Engineer and inspection approval from authorities having jurisdiction.

Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.

Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.

Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:

- A. NFPA 13, "Installation of Sprinkler Systems."
- B. NFPA 13R, "Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."

- C. NFPA 231, "General Storage."
- D. NFPA 231C, "Rack Storage of Materials."

PART 2 PRODUCTS

MANUFACTURERS:

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:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Sprinklers:
 - 1. Badger Fire Protection, Inc.
 - 2. Central Sprinkler Corp.
 - 3. Firematic Sprinkler Devices, Inc.
 - 4. Globe Fire Sprinkler Corp.
 - 5. Grinnell Corp.
 - 6. Reliable Automatic Sprinkler Co., Inc.
 - 7. Star Sprinkler Corp.
 - 8. Viking Corp.

PIPING MATERIALS:

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

PIPES AND TUBES:

Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 6 (DN150) and smaller, and Schedule 30 in NPS 8 (DN200) and larger.

Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 (DN125) and smaller and NFPA 13 specified wall thickness in NPS 6 to NPS 10 (DN150 to DN250).

PIPE AND TUBE FITTINGS:

Malleable-Iron Threaded Fittings: ASME B16.3.

Steel, Threaded Couplings: ASTM A 865.

Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.

Steel Flanges and Flanged Fittings: ASME B16.5.

Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47 (ASTM A 47M), malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

Steel, Press-Seal Fittings: UL 213 and FM-approved, 175-psig (1200-kPa) pressure rating; with steel housing, butylene O-rings, and pipe stop; for use with Schedule 5, plain-end, steel pipe. Include UL 45-listed fitting manufacturer's pressure-sealing tools.

JOINING MATERIALS:

Steel, Keyed Couplings: UL 213 and AWWA C606, for steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gaskets, and steel bolts and nuts. Include listing for dry-pipe service for couplings for dry piping.

Transition Couplings: AWWA C219, sleeve type, or other manufactured fitting the same size as, with pressure rating at least equal to, and with ends compatible with piping to be joined.

SPRINKLERS:

Automatic Sprinklers: With heat-responsive element complying with the following:

- A. UL 199, for applications except residential.
- B. UL 1767, for early suppression, fast-response applications.

Sprinkler Types and Categories: Nominal 1/2-inch (12.7-mm) orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.

Sprinkler types, features, and options include the following:

- A. Concealed ceiling sprinklers, including cover plate.
- B. Extended-coverage sprinklers.
- C. Pendent sprinklers.
- D. Quick-response sprinklers.
- E. Upright sprinklers.
- F. Sidewall sprinklers

Sprinkler Finishes: Chrome-plated, bronze, and painted.

Special Coatings: Wax, lead, and corrosion-resistant paint.

Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

- A. Ceiling Mounting: Chrome-plated steel, one piece, flat.
- B. Sidewall Mounting: Chrome-plated steel, one piece, flat.

SPECIALTY SPRINKLER FITTINGS:

Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible with piping.

Dry-Pipe-System Fittings: UL listed for dry-pipe service.

Press-Seal Fittings: UL 213, steel housing with butylene O-rings and pipe stop.

Locking-Lug Fittings: UL 213, ductile-iron body with locking-lug ends.

Mechanical-T Fittings: UL 213, ductile-iron housing with pressure-responsive gasket, bolts, and threaded or locking-lug outlet.

Mechanical-Cross Fittings: UL 213, ductile-iron housing with pressure-responsive gaskets, bolts, and threaded or locking-lug outlets.

Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.

PART 3 EXECUTION

PREPARATION:

Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.

Report test results promptly and in writing.

PIPING APPLICATIONS:

Do not use welded joints with galvanized steel pipe.

Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

Sprinkler Branch Piping: Use the following:

Wet-Pipe, Sprinkler Branch Piping: Use the following:

- A. NPS 2 (DN50) and Smaller: Standard-weight steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
- B. NPS 2 (DN50) and Smaller: Standard-weight steel pipe with plain ends, locking-lug fittings, and twist-locked joints.
- C. NPS 2 (DN50) and Smaller: Schedule 10 steel pipe with plain ends, steel welding fittings, and welded joints.

Dry-Pipe Sprinklers: Use the following:

- A. NPS 2 (DN50) and Smaller: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
- B. NPS 2 (DN50) and Smaller: Galvanized, standard-weight steel pipe with plain ends; locking-lug fittings; and twist-locked joints.

JOINT CONSTRUCTION:

Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.

Press-Seal-Fitting Joints: Use UL-listed tool and procedure and follow fitting manufacturer's written instructions. Include use of specific equipment, pressure-sealing tool, and accessories.

Locking-Lug-Fitting, Twist-Locked Joints: Follow fitting manufacturer's written instructions.

Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 15

Section "Basic Mechanical Materials and Methods" for dielectric fittings.

Handling of Cleaners, Primers, and Solvent Cements for CPVC Pipe: Comply with procedures in ASTM F 402 for safe handling when joining CPVC piping with solvent cements.

PIPING INSTALLATION:

Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

- A. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

Install sprinkler piping with drains for complete system drainage.

Hangers and Supports: Comply with NFPA 13 for hanger materials and installation.

Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.

SPRINKLER APPLICATIONS:

General: Use sprinklers according to the following applications:

- A. Rooms without Ceilings: Upright or pendent sprinklers.
- B. Rooms with Ceilings: Concealed (flush covers) sprinklers.
- C. Wall Mounting: Sidewall sprinklers.
- D. Special Applications: Use extended-coverage, flow-control, and quick-response sprinklers where indicated.
- E. Sprinkler Finishes: Use sprinklers with the following finishes:

Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

Flush Sprinklers: Bright chrome, with painted white escutcheon.

Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

SPRINKLER INSTALLATION:

Install sprinklers in suspended ceilings in center of acoustical panels and tiles.

Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels.

Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

CONNECTIONS:

Electrical Connections: Power wiring is specified in Division 26.

FIELD QUALITY CONTROL:

Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.

Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

Report test results promptly and in writing to Architect and authorities having jurisdiction.

CLEANING:

Clean dirt and debris from sprinklers.

Remove and replace sprinklers having paint other than factory finish.

PROTECTION:

Protect sprinklers from damage until Substantial Completion.

COMMISSIONING:

Verify that specified tests of piping are complete.

Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.

Drain dry-pipe sprinkler piping.

Pressurize and check dry-pipe sprinkler piping air-pressure maintenance devices and air compressors.

Fill wet-pipe sprinkler piping with water.

Coordinate with fire alarm tests. Operate as required.

DEMONSTRATION:

Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.

Schedule demonstration with Owner with at least seven days' advance notice.

END OF SECTION

23 05 05 MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

GENERAL INFORMATION:

The General Requirements and Supplementary Conditions are part of this contract and govern work under this division.

Temporary heating and air conditioning shall be the responsibility of the General Contractor. If the Contractor uses the permanent heating or air conditioning systems for temporary heating or air conditioning, extended warranties will be required on all equipment in use and replace filters in all units once a week. The extended warranties and filter replacement will need to cover the period between when the systems are turned on through Final Acceptance of the building. This shall include boilers, pumps, FPVAV's and AHU's, Etc. At the time of final inspection, if it is found that the interior of ductwork is dirty beyond normal standards, the ductwork systems shall be cleaned at the Contractor's expense.

SCOPE OF WORK:

Work by Mechanical Contractor: Provide all mechanical systems indicated by the drawings, specified or as instructed otherwise. Unless specified otherwise, provide all labor, materials and equipment necessary to provide a complete and operational system.

Work by Electrical Contractor: Provide all line voltage wiring and install items of equipment furnished by the Mechanical, such as thermostats, remote control panels, etc.

Mechanical and Electrical Coordination: The Mechanical will provide to the Electrical all manufacturer's wiring diagrams and installation data and locate all equipment furnished to the Electrical.

Where work or materials are specified or shown on drawings to be performed by more than one Contractor, each such Contractor will be deemed to have figured the item and the Architect will determine who shall furnish the work and who shall submit the credit to the Owner.

Work by General Contractor: Provide all openings and chases with proper framing and reinforcing as required for Mechanical equipment.

Provide access panels or doors where required for mechanical systems.

Provide concrete pads for all base mounted mechanical equipment.

Provide all exterior and interior louvers per the sizes indicated in the Mechanical contract documents.

DEFINITIONS:

Contractor: The contractor performing work under this Division of the Specifications.

Provide: Contractor is responsible to furnish and install component completely.

QUALITY ASSURANCE:

Manufacturers: Acceptable manufacturers are listed in applicable sections of the Specifications and on the drawings.

Drawings and Specifications are complimentary. Requirements indicated in either are binding and the most stringent is to be used.

The Contractor is to review documents for the work, and if any discrepancies occur between the work of this Division and the work of another Division, is to notify the Architect and obtain written instructions for any changes necessary. Any changes in the work by this Division made necessary by the failure or neglect of the Contractor to report such discrepancies will be made by, and at the expense of the Contractor.

Changes in Design or Installation: Refer to the General and Supplementary Conditions for requirements pertaining to changes in design and installation. Mechanical installation will otherwise be in accordance with the Contract Drawings and Specifications.

REGULATORY AGENCIES:

Permits and Fees: The Contractor is to pay for all permits and fees as required by Local or State regulatory agencies.

Codes: Work for this project is to comply with Federal, State and Local codes, ordinances and regulations. All work shall comply the latest adopted edition of the Building Code and associated sections of the National Fire Protection Association.

Work shall be done according to applicable codes in cases of conflict between specifications, plans and codes, except where plans and specifications call for higher standards than the codes.

SUBMITTALS AND SHOP DRAWINGS:

Submit product data and copies of shop drawings for all major pieces of equipment as indicated in the respective sections of this Division.

The intent of shop drawing submittals by the Contractor is to demonstrate to the Architect / Engineer that the Contractor understands the design concept and demonstrates his understanding by indicating and detailing the fabrication and installation methods to be used.

If deviations, discrepancies or conflicts between shop drawing submittals and Contract Documents are discovered either prior to or after shop drawing submittals are processed, the design drawings and specifications shall take precedence.

The Architect / Engineer shall review shop drawings for general conformance with the design concept of the project. The review shall not relieve the Contractor of the responsibility of compliance with the contract documents, installation of equipment per manufacturer's requirements, or errors in the shop drawings.

PRODUCT DELIVERY, STORAGE AND HANDLING:

Make provisions for the delivery and safe storage of all material and make the required arrangements with other trades to coordinate moving large pieces of equipment into the building.

Where materials are indicated to be "Furnished by Others" to the Contractor for installation, these materials shall be checked and their delivery properly receipted. After delivery the Contractor assumes all responsibility for the safekeeping of such equipment.

All materials stored outside are to be covered and protected with weatherproof material.

JOB CONDITIONS:

Verify existing site conditions and location prior to bidding.

Verify existing utilities and the actual location of in reference to location of such as shown on drawings. Any deviations between actual conditions and plan locations will be reviewed with the Architect. Repair, patch or terminate utilities encountered in an acceptable manner regardless of whether shown or not.

GUARANTEE:

The Contractor is to guarantee all materials, equipment, workmanship and operation of all systems for a period of one (1) year from the date of final acceptance of the entire project. Guarantee to repair or replace at Contractor's expense any art of the work which may be defective during that time provided that such defect is, in the opinion of the Architect / Engineer, due to imperfect material or workmanship and not to carelessness or improper use.

PART 2 PRODUCTS

STANDARDS FOR EQUIPMENT AND MATERIALS:

All material shall be labeled UL, ETL, AGA or other approved independent testing authority. Air conditioning equipment shall be ARI certified.

All pressure rated vessels shall be provided with an ASME stamp, meeting the ASME Code or the Local Authority, whichever is most stringent.

All materials and equipment shall be of the best quality and be new, unused and without damage.

System design is based upon the first manufacturer listed in the Specifications and the other named manufacturers are considered equivalent. Any costs attributed in changes in ductwork, piping, plumbing, space clearances or other trades is to be borne by the Contractor when another manufacturer is used in lieu of the first listed.

MATERIALS OF APPROVED EQUAL:

Unless request for changes in base bid specifications are received and approved ten (10) days prior to the opening of bids, the successful Contractor will be held to furnish specified items under base bid.

PART 3 EXECUTION

PREPARATION:

Base final installation of all materials and equipment on field dimensions and conditions at the building. The Mechanical Contractor is to inspect all work that affects the work of this Division and

report any deficiencies to the General Contractor and Architect. No extra compensation will be allowed on account of minor differences in actual dimensions and those indicated on the plans.

INSTALLATION:

Workmanship: Perform all work in accordance with good commercial practice.

Supervision: The superintendent shall be responsible for the work of this Division and of all subcontractors under this Division. All questions or directions will be directed through the superintendent.

Installation Procedures:

- A. Field verify exact location, size, routing, elevation and accessibility of existing and new HVAC and plumbing systems.
- B. Properly size and locate all anchors, chases, recesses and openings required for the proper installation of the work.
- C. Piping and equipment located in areas subject to low temperatures shall be installed in a manner to prevent freezing.
- D. All equipment and materials are to be installed as high as possible.
- E. Install equipment and systems in accordance with manufacturer's recommends, accepted industry standards and all applicable Codes.
- F. Provide temporary filters in all air systems during construction. Install new clean filters prior to testing and balancing systems. Provide an extra set of filters to Owner at completion of project.

END OF SECTION

23 05 06 BASIC HVAC MATERIALS AND METHODS

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

- A. Piping materials and installation instructions common to most piping systems.
- B. Dielectric fittings.
- C. Flexible connectors.
- D. Equipment nameplate data requirements.
- E. Field-fabricated metal and wood equipment supports.
- F. Installation requirements common to equipment specification sections.
- G. Mechanical demolition.
- H. Cutting and patching.
- I. Touchup painting and finishing.

Pipe and pipe fitting materials are specified in Division 23 piping system Sections.

DEFINITIONS:

Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

The following are industry abbreviations for rubber materials:

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. EPDM: Ethylene propylene diene terpolymer rubber.

SUBMITTALS:

Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

QUALITY ASSURANCE:

Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

DELIVERY, STORAGE, AND HANDLING:

Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

Protect flanges, fittings, and piping specialties from moisture and dirt.

SEQUENCING AND SCHEDULING:

Coordinate mechanical equipment installation with other building components.

Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."

Coordinate installation of identifying devices after completing covering and painting, if devices are

applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Dielectric Unions:
 - 1. Capitol Manufacturing Co.
 - 2. Central Plastics Co.
 - 3. Eclipse, Inc.; Rockford-Eclipse Div.
 - 4. Epcos Sales Inc.
 - 5. Hart Industries International, Inc.
 - 6. Watts Industries, Inc.; Water Products Div.
 - 7. Zurn Industries, Inc.; Wilkins Div.

- B. Dielectric Flanges:
 - 1. Capitol Manufacturing Co.
 - 2. Central Plastics Co.
 - 3. Epcos Sales Inc.
 - 4. Watts Industries, Inc.; Water Products Div.

- C. Dielectric-Flange Insulating Kits:
 - 1. Calpico, Inc.
 - 2. Central Plastics Co.

- D. Dielectric Couplings:
 - 1. Calpico, Inc.
 - 2. Lochinvar Corp.

- E. Dielectric Nipples:
 - 1. Grinnell Corp.; Grinnell Supply Sales Co.
 - 2. Perfection Corp.
 - 3. Victaulic Co. of America.

- F. Metal, Flexible Connectors:
 - 1. ANAMET Industrial, Inc.
 - 2. Central Sprink, Inc.
 - 3. Flexicraft Industries.
 - 4. Flex-Weld, Inc.
 - 5. Grinnell Corp.; Grinnell Supply Sales Co.
 - 6. Hispan Precision Products, Inc.
 - 7. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
 - 8. Mercer Rubber Co.
 - 9. Metraflex Co.
 - 10. Proco Products, Inc.
 - 11. Uniflex, Inc.
 - 12. Flexonics.

PIPE AND PIPE FITTINGS:

Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

JOINING MATERIALS:

Refer to individual Division 23 piping Sections for special joining materials not listed below.

Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

- A. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, unless thickness or specific material is indicated.
 - 1. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

Solder Filler Metals: ASTM B 32.

- A. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with 0.10 percent lead content.
- B. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.

Brazing Filler Metals: AWS A5.8.

- A. BCuP Series: Copper-phosphorus alloys.
- B. BAg1: Silver alloy.

Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

- A. Sleeve: ASTM A 126, Class B, gray iron.
- B. Followers: ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 536 ductile iron.
- C. Gaskets: Rubber.
- D. Bolts and Nuts: AWWA C111.
- E. Finish: Enamel paint.

DIELECTRIC FITTINGS:

General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent

galvanic action and stop corrosion.

Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

Insulating Material: Suitable for system fluid, pressure, and temperature.

Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

- A. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

FLEXIBLE CONNECTORS:

General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

- A. 2-Inch NPS (DN50) and Smaller: Threaded.
- B. 2-1/2-Inch NPS (DN65) and Larger: Flanged.
- C. Option for 2-1/2-Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.

Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

PIPING SPECIALTIES:

Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

- A. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain en

ds and integral waterstop, unless otherwise indicated.

- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with set screws.

PART 3 EXECUTION

PIPING SYSTEMS - COMMON REQUIREMENTS:

General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 23 piping Sections specify unique piping installation requirements.

General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

Install piping at indicated slope.

Install components with pressure rating equal to or greater than system operating pressure.

Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

Install piping free of sags and bends.

Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.

Locate groups of pipes parallel to each other, spaced to permit valve servicing.

Install fittings for changes in direction and branch connections.

Install couplings according to manufacturer's written instructions.

Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

Verify final equipment locations for roughing-in.

Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 2. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 3. Align threads at point of assembly.
 4. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
- G. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

Piping Connections: Make connections according to the following, unless otherwise indicated:

- A. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.
- B. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
- C. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
- D. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

EQUIPMENT INSTALLATION - COMMON REQUIREMENTS:

Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

Install mechanical equipment to facilitate service, maintenance, and repair or replacement of

components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

Install equipment giving right of way to piping installed at required slope.

Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

PAINTING AND FINISHING:

Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

ERECTION OF METAL SUPPORTS AND ANCHORAGE:

Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

ERECTION OF WOOD SUPPORTS AND ANCHORAGE:

Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.

Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

Attach to substrates as required to support applied loads.

DEMOLITION:

Disconnect, demolish, and remove Work specified in Division 23 Sections.

If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.

Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches (50 mm) beyond face of adjacent construction. Cap and patch surface to match existing finish.

Removal: Remove indicated equipment from Project site.

Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

CUTTING AND PATCHING:

Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

Repair cut surfaces to match adjacent surfaces.

END OF SECTION

23 05 23 GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes general duty valves common to several mechanical piping systems.

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

- A. Special purpose valves are specified in Division 23 piping system Sections.
- B. Valve tags and charts are specified in Division 23 Section "Mechanical Identification."

SUBMITTALS:

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Include list indicating valve and its application.

Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

QUALITY ASSURANCE:

Single-Source Responsibility: Comply with the requirements specified in Division 1 Section "Materials and Equipment," under "Source Limitations" Paragraph.

ASME Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.

MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

DELIVERY, STORAGE, AND HANDLING:

Prepare valves for shipping as follows:

- A. Protect internal parts against rust and corrosion.
- B. Protect threads, flange faces, grooves, and weld ends.
- C. Set globe and gate valves closed to prevent rattling.
- D. Set ball and plug valves open to minimize exposure of functional surfaces.
- E. Set butterfly valves closed or slightly open.
- F. Block check valves in either closed or open position.

Use the following precautions during storage:

- A. Maintain valve end protection.
- B. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Ball Valves:
 1. Hammond Valve Corporation.
 2. Milwaukee Valve Company, Inc.
 3. NIBCO Inc.
 4. Stockham Valves & Fittings, Inc.
 5. Victaulic Company of America.
 6. Apollo.
- C. Plug Valves:
 1. NIBCO Inc.
 2. Stockham Valves & Fittings, Inc.
 3. Victaulic Company of America.
- D. Globe Valves:
 1. Hammond Valve Corporation.
 2. Milwaukee Valve Company, Inc.
 3. NIBCO Inc.
 4. Stockham Valves & Fittings, Inc.

BASIC, COMMON FEATURES:

Design: Rising stem or rising outside screw and yoke stems, except as specified below.

Nonrising stem valves may be used only where headroom prevents full extension of rising stems.

Pressure and Temperature Ratings: As indicated in the "Application Schedule" of Part 3 of this Section and as required to suit system pressures and temperatures.

Sizes: Same size as upstream pipe, unless otherwise indicated.

Operators: Use specified operators and handwheels, except provide the following special operator features:

- A. Lever Handles: For quarter-turn valves 6 inches (DN150) and smaller, except for plug valves, which shall have square heads. Furnish Owner with 1 wrench for every 10 plug valves.

Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

Threads: ASME B1.20.1.

Flanges: ASME B16.1 for cast iron, ASME B16.5 for steel, and ASME B16.24 for bronze valves.

Solder Joint: ASME B16.18.

Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F (450 deg C) for gate, globe, and check valves; below 421 deg F (216 deg C) for ball valves.

BALL VALVES:

Ball Valves, 4 Inches (DN100) and Smaller: MSS SP-110, Class 150, 600-psi (4140-kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch (DN15) valves and smaller and full port for 3/4-inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections:

Operator: Vinyl-covered steel lever handle, unless noted otherwise.

PLUG VALVES:

Plug Valves: MSS SP-78, 175-psi (1200-kPa) CWP, ASTM A 126 cast-iron body and bonnet, cast-iron plug, Buna N, Viton, or teflon packing, flanged or grooved end connections:

Operator: Lever.

GLOBE VALVES:

Globe Valves, 2-1/2 Inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) CWP, or Class 150, 300-psi (2070-kPa) CWP; ASTM B 62 cast-bronze body and screwed bonnet, rubber, bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.

Globe Valves, 3 Inches (DN80) and Larger: MSS SP-85, Class 125, 200-psi (1380-kPa) CWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

PART 3 EXECUTION

EXAMINATION:

Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

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.

Operate valves from fully open to fully closed positions. Examine guides and seats made accessible by such operation.

Examine threads on valve and mating pipe for form and cleanliness.

Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

Do not attempt to repair defective valves; replace with new valves.

INSTALLATION:

Install valves as indicated, according to manufacturer's written instructions.

Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.

Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

Locate valves for easy access and provide separate support where necessary.

Install valves in horizontal piping with stem at or above the center of the pipe.

Install valves in a position to allow full stem movement.

For chain-wheel operators, extend chains to 60 inches (1500 mm) above finished floor elevation.

Install check valves for proper direction of flow as follows in a horizontal or vertical position with hinge pin level.

SOLDERED CONNECTIONS:

Cut tube square and to exact lengths.

Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.

Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

Open gate and globe valves to fully open position.

Remove the cap and disc holder of swing check valves having composition discs.

Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

THREADED CONNECTIONS:

Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

Align threads at point of assembly.

Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

FLANGED CONNECTIONS:

Align flange surfaces parallel.

Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

VALVE END SELECTION:

Select valves with the following ends or types of pipe/tube connections:

- A. Copper Tube Size, 2-1/2 Inches (DN65) and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
- B. Steel Pipe Sizes, 2 Inches (DN65) and Smaller: Threaded or grooved end.
- C. Steel Pipe Sizes, 2-1/2 Inches (DN80) and Larger: Grooved end or flanged.

APPLICATION SCHEDULE:

General Application: Use ball and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty. Refer to piping system Specification Sections for specific valve applications and arrangements.

- A. Heating Water Systems: Use the following valve types:
 1. Ball Valves: Class 150, 600-psi (4140-kPa) CWP, with stem extension and memory stop.
 2. Globe Valves: Class 150, bronze or cast-iron body to suit piping system, and bronze disc.
 3. Butterfly Valves: Nickel-plated ductile iron, aluminum bronze, or epoxy-coated ductile iron disc; EPDM or Buna N sleeve and stem seals.
 4. Bronze Swing Check: Class 150, with composition seat.

ADJUSTING:

Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION

23 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes hangers and supports for mechanical system piping and equipment.

Related Sections include the following:

- A. Division 5 Section "Metal Fabrications" for materials for attaching hangers and supports to building structure.
- B. Division 21 Sections on fire-suppression piping for fire-suppression pipe hangers.
- C. Division 23 Section "Mechanical Vibration Controls and Seismic Restraints" for vibration isolation and seismic restraint devices.

DEFINITIONS:

MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

PERFORMANCE REQUIREMENTS:

Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

Design seismic restraint hangers and supports for piping and equipment.

Design and obtain approval from authorities having jurisdiction for seismic restraint hangers and supports for piping and equipment.

SUBMITTALS:

Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

Shop Drawings: Signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details.

Welding Certificates: Copies of certificates for welding procedures and operators.

QUALITY ASSURANCE:

Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Pipe Hangers:
 - 1. AAA Technology and Specialties Co., Inc.
 - 2. B-Line Systems, Inc.
 - 3. Erico.
 - 4. Globe Pipe Hanger Products, Inc.
 - 5. Grinnell Corp.
 - 6. GS Metals Corp.
 - 7. National Pipe Hanger Corp.
 - 8. PHD Manufacturing, Inc.
 - 9. PHS Industries, Inc.
 - 10. Piping Technology & Products, Inc.

- B. Channel Support Systems:
 - 1. B-Line Systems, Inc.
 - 2. Erico.
 - 3. Grinnell Corp.; Power-Strut Unit.
 - 4. GS Metals Corp.
 - 5. National Pipe Hanger Corp.
 - 6. Thomas & Betts Corp.
 - 7. Unistrut Corp.

- C. Thermal-Hanger Shield Inserts:
 - 1. PHS Industries, Inc.
 - 2. Pipe Shields, Inc.
 - 3. Rilco Manufacturing Co., Inc.
 - 4. Value Engineered Products, Inc.

- D. Powder-Actuated Fastener Systems:
 - 1. Gunnebo Fastening Corp.
 - 2. Hilti, Inc.
 - 3. ITW Ramset/Red Head.
 - 4. Masterset Fastening Systems, Inc.

MANUFACTURED UNITS:

Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

- A. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
- B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in

direct contact with copper tubing.

Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.

- A. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- B. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

Thermal-Hanger Shield Inserts: 100-psi (690-kPa) minimum compressive-strength insulation, encased in sheet metal shield.

- A. Material for Piping: ASTM C 552, Type I cellular glass or high density polyisocyanurate insulation.
- B. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
- C. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
- D. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield.

MISCELLANEOUS MATERIALS:

Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

Grout: ASTM C 1107, Grade B, factory-mixed and -packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.

- A. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
- B. Properties: Nonstaining, noncorrosive, and nongaseous.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 EXECUTION

HANGER AND SUPPORT APPLICATIONS:

Specific hanger requirements are specified in Sections specifying equipment and systems.

Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

All hangers are to be sized to allow for continuous installation of insulation and thermal insulation shield. Hangers are to be sized to match the O.D. of insulated pipes or O.D. of uninsulated pipes.

Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

- A. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated

stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).

Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

- A. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
- B. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- C. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
- D. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
- E. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

Building Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

- A. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
- B. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
- C. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
- D. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
- E. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
- F. C-Clamps (MSS Type 23): For structural shapes.
- G. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
- H. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
- I. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
- J. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
- K. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- L. 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:
 - 1. Light (MSS Type 31): 750 lb (340 kg).
 - 2. Medium (MSS Type 32): 1500 lb (675 kg).
 - 3. Heavy (MSS Type 33): 3000 lb (1350 kg).
- M. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- N. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- O. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where head room is limited.

Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

- A. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
- B. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

- C. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi (690-kPa) minimum compressive-strength, high density polyisocyanurate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.

HANGER AND SUPPORT INSTALLATION:

Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

- A. Field assemble and install according to manufacturer's written instructions.

Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, 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.

Install powder-actuated drive-pin fasteners 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.

Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

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.

Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

Insulated Piping: Comply with the following:

- A. Attach clamps and spacers to piping.
 - 1. Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - 2. Do not exceed pipe stress limits according to ASME B31.9.
- B. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - 1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
- C. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall

span arc of 180 degrees.

1. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.

D. Shield Dimensions for Pipe: Not less than the following:

1. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
2. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
3. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
4. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
5. NPS 16 to NPS 24 (DN400 to DN600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.

E. Insert Material: Length at least as long as protective shield.

F. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

EQUIPMENT SUPPORTS:

Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

Grouting: Place grout under supports for equipment and make smooth bearing surface.

METAL FABRICATION:

Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

- A. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- B. Obtain fusion without undercut or overlap.
- C. Remove welding flux immediately.
- D. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

ADJUSTING:

Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

PAINTING:

Touching Up: 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.

- A. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section "Painting."

Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

23 05 93 TESTING AND BALANCING

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:

- A. Balancing airflow and water flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
- A. Adjusting total HVAC systems to provide indicated quantities.
- B. Measuring electrical performance of HVAC equipment.
- C. Setting quantitative performance of HVAC equipment.
- D. Verifying that automatic control devices are functioning properly.
- E. Reporting results of the activities and procedures specified in this Section.

Related Sections include the following:

- A. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
- B. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

DEFINITIONS:

Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.

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.

Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

Report Forms: Test data sheets for recording test data in logical order.

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.

Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

System Effect: A phenomenon that can create undesired or unpredicted conditions that cause

reduced capacities in all or part of a system.

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.

Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

Test: A procedure to determine quantitative performance of a system or equipment.

Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.

AABC: Associated Air Balance Council.

AMCA: Air Movement and Control Association.

NEBB: National Environmental Balancing Bureau.

SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

SUBMITTALS:

Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.

Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.

Sample Report Forms: Submit 2 sets of sample testing, adjusting, and balancing report forms.

Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

QUALITY ASSURANCE:

Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.

Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:

- A. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
- B. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.

Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."

Testing, Adjusting, and Balancing Reports: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.

Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

PROJECT CONDITIONS:

Full Owner Occupancy: The Owner will occupy the site and existing building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

COORDINATION:

Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.

Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.

Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

WARRANTY:

General Warranty: The national project performance guarantee 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.

PART 2 PRODUCTS

CONTRACTORS:

Contractors: Subject to compliance with requirements, provide services by one of the following:

- A. Testing, Balancing and Controls:
 1. Allied Laboratories.
 2. QTAB.
 3. EMC2.
 4. Pro Balance.

PART 3 EXECUTION

EXAMINATION:

Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.

- A. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
- B. 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.

Examine approved submittal data of HVAC systems and equipment.

Examine project record documents described in Division 1 Section "Project Record Documents."

Examine Architect's and Engineer's 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.

Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.

Examine system and equipment test reports.

Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

Examine terminal units, such as variable-air-volume boxes and mixing boxes, to verify that they are accessible and their controls are connected and functioning.

Examine equipment for installation and for properly operating safety interlocks and controls.

Examine automatic temperature system components to verify the following:

- A. Dampers, valves, and other controlled devices operate by the intended controller.
- B. Dampers and valves are in the position indicated by the controller.
- C. 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.
- D. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.

Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

PREPARATION:

Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.

Complete system readiness checks and prepare system readiness reports. Verify the following:

- A. Permanent electrical power wiring is complete.
- B. Hydronic systems are filled, clean, and free of air.
- C. Automatic temperature-control systems are operational.
- D. Equipment and duct access doors are securely closed.
- E. Balance, smoke, and fire dampers are open.
- F. Isolating and balancing valves are open and control valves are operational.
- G. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
- H. Windows and doors can be closed so design conditions for system operations can be met.

GENERAL TESTING AND BALANCING PROCEDURES:

Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.

Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES:

Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

Prepare schematic diagrams of systems' "as-built" duct layouts.

For variable-air-volume systems, develop a plan to simulate diversity.

Determine the best locations in main and branch ducts for accurate duct airflow measurements.

Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

Check dampers for proper position to achieve desired airflow path.

Check for airflow blockages.

Check for proper sealing of air-handling unit components.

CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES:

The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems. Additional procedures are required for variable-air-volume, multizone, dual-duct, induction-unit supply-air systems and process exhaust-air systems. These additional procedures are specified in other articles in this Section.

Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.

- A. Measure fan static pressures to determine actual static pressure as follows:
 1. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 2. Measure static pressure directly at the fan outlet or through the flexible connection.
 3. 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.
 4. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
- B. Measure static pressure across each air-handling unit component.
 1. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
- C. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers under final balanced conditions.
- D. 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.
- E. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.

- F. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.

Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.

- A. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - 1. Where sufficient space in submains 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.
- B. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.

Measure terminal outlets and inlets without making adjustments.

- A. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.

Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.

- A. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
- B. Adjust patterns of adjustable outlets for proper distribution without drafts.

VARIABLE-AIR-VOLUME SYSTEMS' ADDITIONAL PROCEDURES:

Compensating for Diversity: When the total airflow of all terminal units is more than the fan design airflow volume, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the design airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.

Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

- A. Set outside-air dampers at minimum, and return- and exhaust-air dampers at a position that simulates full-cooling load.
- B. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge duct losses.
- C. Measure total system airflow. Adjust to within 10 percent of design airflow.
- D. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use the terminal unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.

- E. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.
 - 1. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
- F. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.
- G. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure adequate static pressure is maintained at the most critical unit.
- H. Record the final fan performance data.

FUNDAMENTAL PROCEDURES FOR HYDRONIC SYSTEMS:

Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

Prepare schematic diagrams of systems' "as-built" piping layouts.

Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

- A. Open all manual valves for maximum flow.
- B. Check expansion tank liquid level.
- C. Check makeup-water-station pressure gage for adequate pressure for highest vent.
- D. Check flow-control valves for specified sequence of operation and set at design flow.
- E. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type, unless several terminal valves are kept open.
- F. Set system controls so automatic valves are wide open to heat exchangers.
- G. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
- H. Check air vents for a forceful liquid flow exiting from vents when manually operated.

HYDRONIC SYSTEMS' BALANCING PROCEDURES:

Determine water flow at pumps. Use the following procedures, except for positive-displacement pumps:

- A. Verify impeller size by operating the pump with the discharge valve closed. Verify with the pump manufacturer that this will not damage pump. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on the manufacturer's pump curve at zero flow and confirm that the pump has the intended impeller size.
- B. Check system resistance. With all valves open, read pressure differential across the pump and mark the pump manufacturer's head-capacity curve. Adjust pump discharge valve until design water flow is achieved.
- C. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on the pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual

amperage exceeds motor nameplate amperage.

- D. Report flow rates that are not within plus or minus 5 percent of design.

Set calibrated balancing valves, if installed, at calculated presettings.

Measure flow at all stations and adjust, where necessary, to obtain first balance.

- A. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

Adjust balancing stations to within specified tolerances of design flow rate as follows:

- A. Determine the balancing station with the highest percentage over design flow.
- B. Adjust each station in turn, beginning with the station with the highest percentage over design flow and proceeding to the station with the lowest percentage over design flow.
- C. Record settings and mark balancing devices.

Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures, including outdoor-air temperature.

Measure the differential-pressure control valve settings existing at the conclusions of balancing.

MOTORS:

Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

- A. Manufacturer, model, and serial numbers.
- B. Motor horsepower rating.
- C. Motor rpm.
- D. Efficiency rating if high-efficiency motor.
- E. Nameplate and measured voltage, each phase.
- F. Nameplate and measured amperage, each phase.
- G. Starter thermal-protection-element rating.

TOLERANCES:

Set HVAC system airflow and water flow rates within the following tolerances:

- A. Supply, Return, and Exhaust Fans: Plus 5 to plus 10 percent.
- B. Air Outlets and Inlets: 0 to minus 10 percent.
- C. Heating-Water Flow Rate: 0 to minus 10 percent.
- D. Cooling-Water Flow Rate: 0 to minus 5 percent.

FINAL REPORT:

General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.

Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

- A. Include a list of the instruments used for procedures, along with proof of calibration.

Final Report Contents: In addition to the certified field report data, include the following:

- A. Fan curves.
- B. Manufacturers' test data.
- C. Field test reports prepared by system and equipment installers.
- D. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:

- A. Title page.
- B. Name and address of testing, adjusting, and balancing Agent.
- C. Project name.
- D. Project location.
- E. Architect's name and address.
- F. Engineer's name and address.
- G. Contractor's name and address.
- H. Report date.
- I. Signature of testing, adjusting, and balancing Agent who certifies the report.
- J. Summary of contents, including the following:
 - 1. Design versus final performance.
 - 2. Notable characteristics of systems.
 - 3. Description of system operation sequence if it varies from the Contract Documents.
- K. Nomenclature sheets for each item of equipment.
- L. Data for terminal units, including manufacturer, type size, and fittings.
- M. Notes to explain why certain final data in the body of reports vary from design values.
- N. Test conditions for fans and pump performance forms, including the following:
 - 1. Settings for outside-, return-, and exhaust-air dampers.
 - 2. Conditions of filters.
 - 3. Cooling coil, wet- and dry-bulb conditions.
 - 4. Face and bypass damper settings at coils.
 - 5. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - 6. Inlet vane settings for variable-air-volume systems.
 - 7. Settings for supply-air, static-pressure controller.
 - 8. Other system operating conditions that affect performance.

System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:

- A. Quantities of outside, supply, return, and exhaust airflows.
- B. Water and steam flow rates.
- C. Duct, outlet, and inlet sizes.
- D. Pipe and valve sizes and locations.
- E. Terminal units.
- F. Balancing stations.

Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

- A. Report Data: Include the following:
 - 1. System and air-handling unit number.

2. Location and zone.
3. Traverse air temperature in **deg F (deg C)**.
4. Duct static pressure in **inches wg (Pa)**.
5. Duct size in **inches (mm)**.
6. Duct area in **sq. ft. ((sq. m))**.
7. Design airflow rate in **cfm (L/s)**.
8. Design velocity in **fpm (m/s)**.
9. Actual airflow rate in **cfm (L/s)**.
10. Actual average velocity in **fpm (m/s)**.
11. Barometric pressure in **psig (Pa)**.

Air-Terminal-Device Reports: For terminal units, include the following:

- A. Unit Data: Include the following:
 1. System and air-handling unit identification.
 2. Location and zone.
 3. Test apparatus used.
 4. Area served.
 5. Air-terminal-device make.
 6. Air-terminal-device number from system diagram.
 7. Air-terminal-device type and model number.
 8. Air-terminal-device size.
 9. Air-terminal-device effective area in **sq. ft. ((sq. m))**.

- B. Test Data: Include design and actual values for the following:
 1. Airflow rate in **cfm (L/s)**.
 2. Air velocity in **fpm (m/s)**.
 3. Preliminary airflow rate as needed in **cfm (L/s)**.
 4. Preliminary velocity as needed in **fpm (m/s)**.
 5. Final airflow rate in **cfm (L/s)**.
 6. Final velocity in **fpm (m/s)**.
 7. Space temperature in **deg F (deg C)**.

Instrument Calibration Reports: For instrument calibration, include the following:

- A. Report Data: Include the following:
 1. Instrument type and make.
 2. Serial number.
 3. Application.
 4. Dates of use.
 5. Dates of calibration.

END OF SECTION

23 07 13 DUCT INSULATION

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

Related Sections include the following:

- A. Division 7 Section "Firestopping" for firestopping materials and requirements for penetrations through fire and smoke barriers.
- B. Division 23 Section "Equipment Insulation" for insulation materials and application for pumps, tanks, hydronic specialties, and other equipment.
- C. Division 23 Section "Pipe Insulation" for insulation for piping systems.
- D. Division 23 Section "Metal Ducts" for duct liner.

SUBMITTALS:

Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

Shop Drawings: Show fabrication and installation details for the following:

- A. Removable insulation sections at access panels.
- B. Application of field-applied jackets.
- C. Applications at linkages for control devices.

Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

QUALITY ASSURANCE:

Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

- A. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

- B. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

DELIVERY, STORAGE, AND HANDLING:

Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

COORDINATION:

Coordinate clearance requirements with duct Installer for insulation application.

SCHEDULING:

Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Mineral-Fiber Insulation:
1. CertainTeed Manson.
 2. Knauf FiberGlass GmbH.
 3. Owens-Corning Fiberglas Corp.
 4. John Manville.

INSULATION MATERIALS:

Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

FIELD-APPLIED JACKETS:

General: ASTM C 921, Type 1, unless otherwise indicated.

Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

ACCESSORIES AND ATTACHMENTS:

Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd. (270 g/sq. m).

- A. Tape Width: 4 inches (100 mm).

Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:

- A. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
- B. Galvanized Steel: 0.005 inch (0.13 mm) thick.
- C. Aluminum: 0.007 inch (0.18 mm) thick.

Wire: 0.080-inch (2.0-mm), nickel-copper alloy; 0.062-inch (1.6-mm), soft-annealed, stainless steel; or 0.062-inch (1.6-mm), soft-annealed, galvanized steel.

Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.

- A. Welded Pin Holding Capacity: 100 lb (45 kg) for direct pull perpendicular to the attached surface.

Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

- A. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb (45 kg) for direct pull perpendicular to the adhered surface.

Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

VAPOR RETARDERS:

Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

EXAMINATION:

Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION:

Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

GENERAL APPLICATION REQUIREMENTS:

Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required

for each duct system.

Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

Apply multiple layers of insulation with longitudinal and end seams staggered.

Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

Keep insulation materials dry during application and finishing.

Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

Apply insulation with the least number of joints practical.

Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.

Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

Apply insulation with integral jackets as follows:

- A. Pull jacket tight and smooth.
- B. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
- C. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.

Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.

Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.

- A. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
- B. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.

Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

MINERAL-FIBER INSULATION APPLICATION:

Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor

pins and speed washers.

- A. Apply adhesives according to manufacturer's recommended coverage rates per square foot.
- A. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
- B. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - 1. On duct sides with dimensions 18 inches (450 mm) and smaller, along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - 2. On duct sides with dimensions larger than 18 inches (450 mm). Space 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - 3. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - 4. Do not overcompress insulation during installation.
- C. Impale insulation over anchors and attach speed washers.
- D. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- E. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch (13-mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
- F. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches (450 mm) o.c.
- G. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- H. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch- (150-mm-) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
- I. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.

- A. Apply adhesives according to manufacturer's recommended coverage rates per square foot.
- B. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
- C. Space anchor pins as follows:
 - 1. On duct sides with dimensions 18 inches (450 mm) and smaller, along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - 2. On duct sides with dimensions larger than 18 inches (450 mm). Space 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - 3. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - 4. Do not overcompress insulation during installation.
- D. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

- E. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch (13-mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
- F. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- G. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch- (150-mm-) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
- H. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

FIELD-APPLIED JACKET APPLICATION:

Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

- A. Apply jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
- B. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of jacket manufacturer's recommended adhesive.
- C. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.

DUCT SYSTEM APPLICATIONS:

Insulation materials and thicknesses are specified in schedules at the end of this Section.

Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.

Insulate the following plenums and duct systems:

- A. Indoor concealed supply-, return-, and outside-air ductwork.
- B. Indoor exposed supply-, return-, and outside-air ductwork.

Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

- A. Fibrous-glass ducts.
- B. Metal ducts with duct liner.
- C. Factory-insulated flexible ducts.
- D. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
- E. Flexible connectors.
- F. Vibration-control devices.
- G. Testing agency labels and stamps.
- H. Nameplates and data plates.
- I. Access panels and doors in air-distribution systems.

INDOOR DUCT AND PLENUM APPLICATION SCHEDULE:

Service: Rectangular, low pressure supply-air ducts are to be lined. Reference Section 23 31 13.

Service: Round, supply-air ducts, concealed.

- A. Material: Mineral-fiber blanket.
- B. Thickness: 1-1/2 inches (38 mm).
- C. Number of Layers: One.
- D. Field-Applied Jacket: Foil and paper.
- E. Vapor Retarder Required: Yes.

END OF SECTION

23 07 19 PIPE INSULATION

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

Related Sections include the following:

- A. Division 7 Section "Firestopping" for firestopping materials and requirements for penetrations through fire and smoke barriers.
- C. Division 23 Section "Duct Insulation" for insulation for ducts and plenums.
- D. Division 23 Section "Hangers and Supports" for pipe insulation shields and protection saddles.

SUBMITTALS:

Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

Shop Drawings: Show fabrication and installation details for the following:

- A. Application of protective shields, saddles, and inserts at pipe hangers for each type of insulation and hanger.
- B. Attachment and covering of heat trace inside insulation.
- C. Insulation application at pipe expansion joints for each type of insulation.
- D. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
- E. Removable insulation at piping specialties and equipment connections.
- F. Application of field-applied jackets.

Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

QUALITY ASSURANCE:

Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

- A. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
- B. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

DELIVERY, STORAGE, AND HANDLING:

Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

COORDINATION:

Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports."

Coordinate clearance requirements with piping Installer for insulation application.

SCHEDULING:

Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Mineral-Fiber Insulation:
 - 1. CertainTeed Manson.
 - 2. Knauf FiberGlass GmbH.
 - 3. Owens-Corning Fiberglas Corp.
 - 4. Johns Manville.

INSULATION MATERIALS:

Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

- A. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
- B. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.
- C. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - 1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - 2. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
- D. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
- E. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.

- F. Expanded or Exfoliated Vermiculite Insulating Cements: Comply with ASTM C 196.
- G. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

FIELD-APPLIED JACKETS:

General: ASTM C 921, Type 1, unless otherwise indicated.

Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils (0.5 mm) thick; roll stock ready for shop or field cutting and forming.

- A. Adhesive: As recommended by insulation material manufacturer.
- B. PVC Jacket Color: White or gray.
- C. PVC Jacket Color: Color-code piping jackets based on materials contained within the piping system.

Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- (0.5-mm) thick, high-impact, ultraviolet-resistant PVC.

- A. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
- B. Adhesive: As recommended by insulation material manufacturer.

ACCESSORIES AND ATTACHMENTS:

Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd. (270 g/sq. m).

- A. Tape Width: 4 inches (100 mm).

Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:

- A. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
- B. Galvanized Steel: 0.005 inch (0.13 mm) thick.
- C. Aluminum: 0.007 inch (0.18 mm) thick.

Wire: 0.080-inch (2.0-mm), nickel-copper alloy; 0.062-inch (1.6-mm), soft-annealed, stainless steel; or 0.062-inch (1.6-mm), soft-annealed, galvanized steel.

VAPOR RETARDERS:

Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 EXECUTION

EXAMINATION:

Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION:

Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

GENERAL APPLICATION REQUIREMENTS:

Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

Apply multiple layers of insulation with longitudinal and end seams staggered.

Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

Keep insulation materials dry during application and finishing.

Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

Apply insulation with the least number of joints practical.

Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

- A. Apply insulation continuously through hangers and around anchor attachments.
- B. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches (300 mm) from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- C. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.

- D. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

Apply adhesives and mastics at the manufacturer's recommended coverage rate.

Apply insulation with integral jackets as follows:

- A. Pull jacket tight and smooth.
- B. Circumferential Joints: Cover 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 and spaced 4 inches (100 mm) o.c.
- C. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - 1. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
- D. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
- E. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

- A. Firestopping and fire-resistive joint sealers are specified in Division 7 Section "Firestopping."

MINERAL-FIBER INSULATION APPLICATION:

Apply insulation to straight pipes and tubes as follows:

- A. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
- B. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 m) to form a vapor retarder between pipe insulation segments.
- C. For insulation with factory-applied jackets, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
- D. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

Apply insulation to flanges as follows:

- A. Apply preformed pipe insulation to outer diameter of pipe flange.
- B. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
- C. Fill voids between inner circumference of flange insulation and outer circumference of

adjacent straight pipe segments with mineral-fiber blanket insulation.

- D. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

Apply insulation to fittings and elbows as follows:

- A. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
- B. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, or glass-fiber blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
- C. Cover fittings with standard PVC fitting covers.
- D. Cover fittings with heavy PVC fitting covers. Overlap PVC covers on pipe insulation jackets at least 1 inch (25 mm) at each end. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.

Apply insulation to valves and specialties as follows:

- A. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
- B. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
- C. Apply insulation to flanges as specified for flange insulation application.
- D. Use preformed standard PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
- E. Use preformed heavy PVC fitting covers for valve sizes where available. Secure fitting covers with manufacturer's attachments and accessories. Seal seams with tape and vapor-retarder mastic.
- F. For larger sizes where PVC fitting covers are not available, seal insulation with canvas jacket and sealing compound recommended by the insulation material manufacturer.

FIELD-APPLIED JACKET APPLICATION:

Apply glass-cloth jacket, where indicated, directly over bare insulation or insulation with factory-applied jackets.

- A. Apply jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
- B. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of jacket manufacturer's recommended adhesive.
- C. Completely encapsulate insulation with jacket, leaving no exposed raw insulation.

Foil and Paper Jackets: Apply foil and paper jackets where indicated.

- A. Draw jacket material smooth and tight.
- B. Apply lap or joint strips with the same material as jacket.
- C. Secure jacket to insulation with manufacturer's recommended adhesive.
- D. Apply jackets with 1-1/2-inch (40-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
- E. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-retarder mastic.

Apply PVC jacket on exposed piping in finished spaces, with 1-inch (25-mm) overlap at longitudinal seams and end joints, except for mechanical rooms. Seal with manufacturer's recommended adhesive.

FINISHES:

Glass-Cloth Jacketed Insulation: Paint insulation finished with glass-cloth jacket as specified in Division 9 Section "Painting."

PIPING SYSTEM APPLICATIONS:

Insulation materials and thicknesses are specified in schedules at the end of this Section.

Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

- A. Flexible connectors.
- B. Vibration-control devices.
- C. Fire-suppression piping.
- D. Drainage piping located in crawl spaces, unless otherwise indicated.
- E. Below-grade piping, unless otherwise indicated.
- F. Chrome-plated pipes and fittings, unless potential for personnel injury.
- G. Air chambers, unions, strainers, check valves, plug valves, and flow regulators.

FIELD QUALITY CONTROL:

Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.

Reinstall insulation and covers on fittings and valves uncovered for inspection according to these Specifications.

INSULATION APPLICATION SCHEDULE, GENERAL:

Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.

Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

INTERIOR INSULATION APPLICATION SCHEDULE:

Service: Heating hot-water supply and return.

- A. Operating Temperature: 100 to 200 deg F (38 to 93 deg C).
- B. Insulation Material: Mineral fiber.
- C. Insulation Thickness: 1 inch.
- D. Field-Applied Jacket: None.
- E. Vapor Retarder Required: Yes.
- F. Finish: None.

END OF SECTION

23 21 13 HYDRONIC PIPING

PART 1 GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

SUMMARY

This Section includes piping, special-duty valves, and hydronic specialties for hot-water heating systems.

Related Section include the following:

- A. Division 7 Section "Through-Penetration Firestop Systems" for materials and methods for sealing pipe penetrations through fire and smoke barriers.
- B. Division 7 Section "Joint Sealants" for materials and methods for sealing pipe penetrations through exterior walls.
- C. Division 23 Section "Basic Mechanical Materials and Methods" for general piping materials and installation requirements.
- D. Division 23 Section "Hangers and Supports" for pipe supports, product descriptions and installation requirements. Hanger and support spacing is specified in this Section.
- E. Division 23 Section "Valves" for general-duty gate, globe, ball, butterfly and check valves.
- F. Division 23 Section "Meters and Gages" for thermometers, flow meters and pressure gages.

SUBMITTALS:

Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves.

Shop Drawings: Detail fabrication of pipe anchors, hangers special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure. Detail location of anchors, alignment guides and expansion joints and loops.

Grooved Joint Couplings and Fittings: Grooved joint couplings and fittings shall be shown on drawings and product submittals, and shall be specifically identified with the applicable style or series designation.

Welding Certificate: Copies of certificates for welding procedures and personnel.

Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:

- A. Test procedures used.
- B. Test results that comply with requirements.
- C. Failed test results and corrective action taken to achieve requirements.

Maintenance Data: For hydronic specialties and special-duty valves to include in maintenance manuals specified in Division 1.

QUALITY ASSURANCE

Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

Grooved Joint Couplings and Fittings: All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

- A. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

COORDINATION

Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression system components, and partition assemblies.

Coordinate pipe pressure classes with products specified in related Sections.

PART 2 PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- A. Grooved Mechanical-Joint Fittings and Couplings:
 - 1. Central Sprinkler Company; Central Grooved Piping Products.
 - 2. Grinnell Corporation.
 - 3. Victaulic Company of America.

PIPING MATERIALS:

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

COPPER TUBE AND FITTINGS:

Drawn-Tempered Copper Tubing: ASTM B 88, Type L.

Annealed-Temper Copper Tubing: ASTM B 88, Type K.

Solder Filler Metals: ASTM B 32, 95-5 tin antimony.

Brazing Filler Metals: AWS A5.8, Classification Bag-1 (silver).

STEEL PIPE AND FITTINGS:

Steel Pipe, NPS 2" and smaller: ASTM A 53, Type S (seamless), Grade A, Schedule 40, black steel, plain or grooved ends.

Steel Pipe, NPS 2-1/2" through NPS 12: ASTM A 53, Type E (electric-resistance welded, ERW), Grade A, Schedule 40, black steel, plain or grooved ends.

Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for NPS 2" and smaller and ERW for NPS 2-1/2" and larger.

Cast-Iron Threaded Fittings: ASME B16.4, Classes 125 and 250.

Malleable-Iron Threaded Fittings: ASME B16.3, Classes 125 and 250.

Malleable-Iron Unions: ASME B16.39, Classes 150, 250 and 300.

Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125 and 250; raised ground face and bolt holes spot faced.

Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts and gaskets for the following material group, end connections and facings:

- A. Material Group: 1.1.
- B. End Connections: Butt welding.
- C. Facings: Raised face.

Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 53, Type E or S, Grade B factory-fabricated steel; or ASTM A 234, Grade WPB wrought steel fittings with grooves or shoulders designed to accept grooved end couplings.

Grooved Mechanical-Joint Couplings: Two ductile iron housings and synthetic rubber gasket of central cavity pressure-responsive design; with nuts and bolts to secure grooved end fittings and valves.

- A. Rigid Type: Housings shall be cast with offsetting angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with ANSI B31.1 and B31.9.
 - a. 2" through 8": Installation-Ready, for direct stab installation without field disassembly, with grade EHP gasket rated to +250 deg F. Victaulic Style 107H.
 - b. Victaulic Zero-Flex Style 07.
- B. Flexible Type: For use in locations where vibration attenuation and stress relief are required. Three flexible couplings may be used in lieu of a flexible connector. Victaulic Installation-Ready Style 177 or Style 77.
- C. 14" through 24": Victaulic AGS series with lead-in chamfer on housing key and wide width FlushSeal® gasket.
 - a. Rigid Type: Housing key shall fill the wedge shaped AGS groove and provide rigidity and system support and hanging in accordance with ANSI B31.1 and B31.9. Victaulic Style W07.
 - b. Flexible Type: Housing key shall fit into the wedge shaped AGS groove and allow for linear and angular pipe movement. Victaulic Style W77.
- D. Flange Adapter: Flat face, ductile iron housings with elastomer pressure responsive gasket, for direct connection to ANSI Class 150 flanged components. Victaulic Style 741 / W741.

Flexible Connectors (up to NPS 4"): Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150 psig minimum working pressure and 250 deg. F maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4" misalignment.

Flexible Connector, Grooved Joint Couplings (NPS 2" and larger): Three Victaulic flexible couplings may be used in lieu of a flexible connector for vibration attenuation and stress relief. The couplings shall be placed in close proximity to the source of the vibration.

Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

Gasket Material: Thickness, material and type suitable for fluid to be handled; and design temperatures and pressures.

Grooved Joint Lubricants: Lubricate gaskets in accordance with the manufacturer's recommendations with lubricant supplied by the coupling manufacturer that is suitable for the gasket elastomer and system media. Basis of Design: Victaulic 'Vic-Lube'.

VALVES:

Globe, check, ball and butterfly valves are specified in Division 23 Section "Valves."

Refer to Part 3 "Valve Applications" Article for applications of each valve.

HYDRONIC SPECIALTIES:

Manual Air Vents: Bronze body and nonferrous internal parts, 150 psig working pressure, 225 deg. F operating temperature, manually operated with screwdriver or thumbscrew with NPS 1/8 discharge connection and NPS 1/2 inlet connection.

Flexible Connectors (up to NPS 4"): Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150 psig minimum working pressure and 250 deg. F maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4" misalignment.

Flexible Connector, Grooved Joint Couplings (NPS 2" and larger): Three Victaulic flexible couplings may be used in lieu of a flexible connector for vibration attenuation and stress relief. The couplings shall be placed in close proximity to the source of the vibration.

PART 3 EXECUTION

PIPING APPLICATIONS:

Hot and Chilled Water, NPS 2" and Smaller: Aboveground, use Type L drawn-temper copper tubing with soldered joints, Schedule 40 steel pipe with threaded joints, or Schedule 5S stainless steel pipe with Vic-Press joints. Below ground or within slabs, use Type K annealed-tempered copper tubing with soldered joints. Joints below ground or within slabs is not permitted.

Hot and Chilled Water, NPS 2-1/2" and Larger: Schedule 40 steel pipe with welded or grooved joints.

VALVE APPLICATIONS:

General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:

- A. Shutoff Duty: Ball and butterfly.
- B. Throttling Duty: Globe, ball and butterfly.

Install shutoff duty valves at each branch connection to supply mains and at supply and return connections to each piece of equipment.

PIPING INSTALLATIONS:

Refer to Division 23 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.

Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

Install drains, consisting of a tee fitting, NPS 3/4" ball valve and short NPS 3/4" threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

Install piping at a uniform grade of 0.2 percent upward in direction of flow.

Reduce pipe sizes using eccentric reducer fitting installed with level side up.

Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming off the top of the main pipe at a 45 degree angle. For up-feed risers, install the takeoff coming out the top of the main pipe.

HANGERS AND SUPPORTS:

Hanger, support and anchor devices are specified in Division 23 Section "Hangers and Supports." Comply with requirements below for maximum spacing of supports.

Install the following pipe attachments:

- A. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.

Install hangers for copper tubing, steel, and ductile iron with the following maximum spacing:

- A. 1-1/2" NPS (DN40) and Smaller: Maximum horizontal spacing, 60 inches (1500 mm); maximum vertical spacing, 10 feet (3 m).
- B. 2" through 2-1/2" NPS (DN50 to DN65): Maximum horizontal spacing, 72 inches (1800 mm); maximum vertical spacing, 10 feet (3 m).
- C. 3" NPS (DN80) and Larger: Maximum horizontal spacing, 10 feet (3 m); maximum vertical spacing, 10 feet (3 m).

Minimum rod size to be according to manufacturer's written instructions for service conditions base on maximum hanger spacing.

Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

PIPE JOINT CONSTRUCTION:

Refer to Division 23 Section "Basic Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing; threaded, welded and flanged joints in steel piping; and solvent-weld joints for PVC and CPVC piping.

Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

Install Vic-Press 304™ in accordance with Victaulic recommendations. Pipe shall be certified for use with the Vic-Press 304™ system, square cut (+/-0.030"), properly deburred, and cleaned. Pipe ends shall be marked with a gauge supplied by Victaulic. Use a Victaulic 'PFT' series tool with the proper sized jaw for pressing.

HYDRONIC SPECIALTIES INSTALLATION:

Install manual air vents at high points in piping, at heat transfer coils and elsewhere as required for system air venting.

TERMINAL EQUIPMENT CONNECTIONS:

Size for supply and return piping connections shall be same as for equipment connections.

Install control valves in accessible locations close to connected equipment.

Install ports for pressure and temperature gages at coil inlet and outlet connections.

FIELD QUALITY CONTROL:

Prepare hydronic piping according to ASME B31.9 and as follows:

- A. Leave joints, including welds, uninsulated and exposed for examination during test.
- B. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
- C. Flush system with clean water. Clean strainers after each flush.
- D. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- E. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

Perform the following tests on hydronic piping:

- A. Use ambient temperature water as a testing medium unless there is a risk of freezing. Another liquid that is safe for workers and compatible with piping may be used.
- B. While filling system, use vents installed at high points of system to release trapped air. Use drains installed at low points for complete draining of liquid.
- C. Check expansion tanks to determine that they are not air bound and that the system is full of water.

- D. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve or other component i system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
- E. After hydrostatic test pressure has been applied for at least 12 hours, examine piping, joints, and connections for leakage. Eliminate leaks and repeat test until there are no leaks.
- F. Prepare written report of testing.

ADJUSTING:

Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

Perform these adjustments before operating the system:

- A. Open valves to fully open position.
- B. Check pump for proper direction of rotation.
- C. Set automatic fill valves for required system pressure.
- D. Check air vents at high points of system and determine if all are installed and operation freely (automatic type), or bleed air completely (manual type).
- E. Set temperature controls so all coils are calling for full flow.
- F. Check operation of automatic bypass valves.
- G. Check and set operating temperatures of boilers, chillers and cooling towers to design requirements.
- H. Lubricate motors and bearings.

CLEANING:

Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

END OF SECTION

23 31 13 METAL DUCTS

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from **minus 2- to plus 10-inch wg (minus 500 to plus 2490 Pa)**.

Related Sections include the following:

- A. Division 7 Section "Joint Sealants" for fire-resistant sealants for use around duct penetrations and fire-damper installations in fire-rated floors, partitions, and walls.
- B. Division 8 Section "Access Doors" for wall- and ceiling-mounted access doors for access to concealed ducts.
- C. Division 23 Section "Mechanical Insulation" for duct insulation.
- D. Division 23 Section "Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
- E. Division 23 Section "Air Terminals" for constant-volume and variable-air-volume control boxes, and reheat boxes.
- F. Division 23 Section "Diffusers, Registers, and Grilles."
- G. Division 23 Section "Testing, Adjusting, and Balancing" for air balancing and final adjusting of manual-volume dampers.

DEFINITIONS:

Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula $\text{Btu} \times \text{in.}/\text{h} \times \text{sq. ft.} \times \text{deg F}$ or $\text{W}/\text{m} \times \text{K}$ at the temperature differences specified. Values are expressed as Btu or W.

- A. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.

SYSTEM DESCRIPTION:

Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Not all fittings and offsets are indicated on the plans and it is assumed that the Contractor is to include these to accommodate minor changes required for coordination and installation of duct system. Significant changes to layout or configuration of duct system must be specifically approved in writing by Engineer/Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

SUBMITTALS:

Product Data: For duct liner and sealing materials.

Shop Drawings: Show details of the following:

- A. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
- B. Duct layout indicating pressure classifications and sizes on plans.
- C. Fittings.
- D. Reinforcement and spacing.
- E. Seam and joint construction.
- F. Penetrations through fire-rated and other partitions.
- G. Terminal unit, coil, and humidifier installations.
- H. Hangers and supports, including methods for building attachment, vibration isolation, seismic restraints, and duct attachment.

Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

QUALITY ASSURANCE:

Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.

Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

DELIVERY, STORAGE, AND HANDLING:

Deliver sealant and firestopping materials to 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 multicomponent materials.

Store and handle sealant and firestopping materials according to manufacturer's written recommendations.

Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

PART 2 PRODUCTS

SHEET METAL MATERIALS:

Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

DUCT LINER:

General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."

Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.

- A. Thickness: **1 inch (25 mm)** on all supply and return ductwork.
- B. Thermal Conductivity (k-Value): **0.26 at 75 deg F (0.037 at 24 deg C)** mean temperature.
- C. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
- D. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
- E. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 1. Tensile Strength: Indefinitely sustain a **50-lb- (23-kg-)** tensile, dead-load test perpendicular to duct wall.
 - 2. Fastener Pin Length: As required for thickness of insulation and without projecting more than **1/8 inch (3 mm)** into airstream.
 - 3. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.
- H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Certainteed (ToughGard R)
 - 2. Manson (Akousti-Liner)
 - 3. Manville (Line Acoustic)

SEALANT MATERIALS:

Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

- A. Joint and Seam Tape: **2 inches (50 mm)** wide; glass-fiber fabric reinforced.
- B. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
- C. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
- D. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

HANGERS AND SUPPORTS:

Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.

- A. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than **4 inches (100 mm)** thick.
 - 1. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than **4 inches (100 mm)** thick.

Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.

- A. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or

galvanized rods with threads painted after installation.

- B. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

- A. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
- B. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
- C. Supports for Aluminum Ducts: Aluminum support materials, unless materials are electrolytically separated from ductwork.

RECTANGULAR DUCT FABRICATION:

General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

- A. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
- B. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

Fabricate dishwasher hood exhaust ducts with **0.0500-inch- (1.3-mm-)** thick stainless steel. Weld and flange seams and joints.

Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:

- A. Supply Ducts: **3-inch wg (750 Pa)**.
- B. Return Ducts: **2-inch wg (500 Pa)**, negative pressure.
- C. Exhaust Ducts: **2-inch wg (500 Pa)**, negative pressure.

Cross Breaking or Cross Beading: Cross break or cross bead duct sides **19 inches (480 mm)** and larger and **0.0359 inch (0.9 mm)** thick or less, with more than **10 sq. ft. (0.93 sq. m)** of unbraced panel area, unless ducts are lined.

SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS:

Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.

Apply adhesive to liner facing in direction of airflow not receiving metal nosing.

Butt transverse joints without gaps and coat joint with adhesive.

Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts,

unless duct size and standard liner product dimensions make longitudinal joints necessary.

Apply adhesive coating on longitudinal seams in ducts with air velocity of **2500 fpm (12.7 m/s)**.

Secure liner with mechanical fasteners **4 inches (100 mm)** from corners and at intervals not exceeding **12 inches (300 mm)** transversely around perimeter; at **3 inches (75 mm)** from transverse joints and at intervals not exceeding **18 inches (450 mm)** longitudinally.

Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:

- A. Fan discharge.
- B. Intervals of lined duct preceding unlined duct.
- C. Upstream edges of transverse joints in ducts.

Secure insulation liner with perforated sheet metal liner of same metal thickness as specified for duct, secured to ducts with mechanical fasteners that maintain metal liner distance from duct without compressing insulation.

- A. Sheet Metal Liner Perforations: **3/32-inch (2.4-mm)** diameter, with an overall open area of 23 percent.

Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.

ROUND DUCT FABRICATION:

General: Diameter as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to perimeter of a given size of flat-oval duct.

Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

ROUND AND FLAT-OVAL SUPPLY AND EXHAUST FITTING FABRICATION:

90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

- A. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Round Mitered Elbows: Welded construction with the following metal thickness for

pressure classes from **minus 2- to plus 2-inch wg (minus 500 to plus 500 Pa)**:

1. Ducts **3 to 26 Inches (75 to 660 mm)** in Diameter: **0.028 inch (0.7 mm)**.
2. Ducts **27 to 36 Inches (685 to 915 mm)** in Diameter: **0.034 inch (0.85 mm)**.

- C. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from **2- to 10-inch wg (500 to 2490 Pa)**:
1. Ducts **3 to 14 Inches (75 to 355 mm)** in Diameter: **0.028 inch (0.7 mm)**.
 2. Ducts **15 to 26 Inches (380 to 660 mm)** in Diameter: **0.034 inch (0.85 mm)**.
 3. Ducts **27 to 50 Inches (685 to 1270 mm)** in Diameter: **0.040 inch (1.0 mm)**.
- D. 90-Degree, Two-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material-handling classes A and B; and only where space restrictions do not permit using 1.5 bend radius elbows. Fabricate with single-thickness turning vanes.
- B. Round Elbows, **8 Inches (200 mm)** and Smaller: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
- C. Round Elbows, **9 through 14 Inches (225 through 355 mm)**: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees, unless space restrictions require a mitered elbow. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
- D. Round Elbows, Larger Than **14 Inches (355 mm)**, and All Flat-Oval Elbows: Fabricate gored elbows, unless space restrictions require a mitered elbow.
- E. Die-Formed Elbows for Sizes through **8 Inches (200 mm)** and All Pressures: **0.040 inch (1.0 mm)** thick with two-piece welded construction.
- F. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
- G. Pleated Elbows for Sizes through **14 Inches (355 mm)** and Pressures through **10-Inch wg (2490 Pa)**: **0.022 inch (0.55 mm)**.

PART 3 EXECUTION

DUCT INSTALLATION, GENERAL:

Duct installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.

Construct and install each duct system for the specific duct pressure classification indicated.

Install round and flat-oval ducts in lengths not less than **12 feet (3.7 m)**, unless interrupted by fittings.

Install ducts with fewest possible joints.

Install fabricated fittings for changes in directions, changes in size and shape, and connections.

Install couplings tight to duct wall surface with a minimum of projections into duct.

Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

Install ducts with a clearance of **1 inch (25 mm)**, plus allowance for insulation thickness.

Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least **1-1/2 inches (38 mm)**.

Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

INSULATION:

Provide duct liner on all rectangular supply and return ductwork. All dimensions of ductwork shown on the plans are the required clear interior dimensions unless noted otherwise.

SEAM AND JOINT SEALING:

General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Pressure Classification Less Than **2-Inch wg (500 Pa)**: Transverse joints.

Seal externally insulated ducts before insulation installation.

HANGING AND SUPPORTING:

Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Support horizontal ducts within **24 inches (600 mm)** of each elbow and within **48 inches (1200 mm)** of each branch intersection.

Support vertical ducts at a maximum interval of **16 feet (5 m)** and at each floor.

Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

CONNECTIONS:

Connect equipment with flexible connectors according to Division 23 Section "Duct Accessories."

For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

ADJUSTING:

Adjust volume-control dampers in ducts, outlets, and inlets to achieve design airflow.

Refer to Division 23 Section "Testing, Adjusting, and Balancing" for detailed procedures.

CLEANING:

After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

END OF SECTION

23 33 00 DUCT ACCESSORIES

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes the following:

- A. Fire and smoke dampers.
- B. Turning vanes.
- C. Duct-mounted access doors and panels.
- D. Flexible ducts.
- E. Flexible connectors.
- F. Duct accessory hardware.

Related Sections include the following:

- A. Division 8 Section "Access Doors" for wall- and ceiling-mounted access doors and panels.
- B. Division 23 Section "Air Terminals" for constant-volume and variable-air-volume control boxes, and reheat boxes.
- C. Division 23 Section "Diffusers, Registers, and Grilles."
- D. Division 28 Section "Fire Alarm Systems" for duct-mounted fire and smoke detectors.

SUBMITTALS:

Product Data: For the following:

- A. Manual-volume dampers.
- B. Fire and smoke dampers.
- C. Duct-mounted access doors and panels.
- D. Flexible ducts.

Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:

- A. Special fittings and manual- and automatic-volume-damper installations.
- B. Fire- and smoke-damper installations, including sleeves and duct-mounted access doors and panels.

Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

QUALITY ASSURANCE:

NFPA Compliance: Comply with the following NFPA standards:

- A. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

- B. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

EXTRA MATERIALS:

Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

- A. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 PRODUCTS

SHEET METAL MATERIALS:

Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for 36-inch (900-mm) length or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

Low Pressure Supply Ductwork: to have a 2-inch static pressure classification (i.e., after FPVAV's, SAV's and on low pressure AHU's). Medium pressure supply ductwork to have a 4-inch static pressure classification (i.e., VAV systems).

MANUAL-VOLUME DAMPERS:

General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

- A. Pressure Classifications of 3-Inch wg (750 Pa) or Higher: End oilite bearings for ducts with 3/8" axles full length of damper blades and bearings at both ends of operating shaft. Extended quadrant locks with 3/8" dial regulators and end extended bearing plates for externally insulated ductwork. Rectangular ducts 20" and wider same as above with 16 Ga. blades, 1/2" axles and dial regulators. (Equal to Ruskin MD25/MDRS25)

Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, and suitable for horizontal or vertical applications.

- A. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch (1.62 mm) thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
B. Roll-Formed Steel Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.
C. Blade Axles: Galvanized steel.
D. Tie Bars and Brackets: Galvanized steel.

Jackshaft: 1-inch- (25-mm-) diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

- A. Length and Number of Mountings: Appropriate to connect linkage of each damper of a

multiple-damper assembly.

Damper Hardware: 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. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

FIRE DAMPERS:

General: Labeled to UL 555, static (fan off), Class I.

Fire Rating: One and one-half hours.

Fire Rating: One and one-half and three hours.

Frame: SMACNA Type B with blades *out of airstream*; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.

Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.

- A. Minimum Thickness: **0.052 inch (1.3 mm)** or **0.138 inch (3.5 mm)** thick as indicated, and length to suit application.
- B. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

Mounting Orientation: Vertical or horizontal as indicated.

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.

Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.

Fusible Link: Replaceable, **165 deg F (74 deg C)** rated.

CEILING FIRE DAMPERS:

General: Labeled to UL 555C; comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

Frame: **0.040-inch- (1.0-mm-)** thick, galvanized, sheet steel; round or rectangular; style to suit ceiling construction.

Blades: **0.034-inch- (0.85-mm-)** thick, galvanized, sheet steel with nonasbestos refractory insulation.

Volume Adjustment: UL-labeled, fusible volume-control adjustment.

Fusible Link: Replaceable, **165 deg F (74 deg C)** rated.

COMBINATION FIRE/SMOKE DAMPERS:

General: Labeled to UL 555S. Combination fire and smoke dampers shall be labeled for one-and-one-half-hour rating to UL 555, dynamic, Class I.

Fusible Link: Replaceable, 165 deg F (74 deg C) rated.

Frame and Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.

Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel; length to suit wall or floor application.

Damper Motors: Provide for modulating or two-position action.

- A. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
- B. 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).
- C. Outdoor Motors and Motors in Outside-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).
- D. 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).
- E. Two-Position Motor: 115 V, single phase, 60 Hz.
- F. Automatic override option.
- G. Resetable Link.

SMOKE DAMPERS:

General: Labeled to UL 555S. Damper to be rated to Leakage Class III with elevated temperature rating of 250°F.

Frame and Blades: 0.064-inch- (1.62-mm-) thick, galvanized, sheet steel.

Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized, sheet steel; length to suit wall or floor application.

Damper Motors: Provide for modulating or two-position action.

- A. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
- B. 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).
- C. Outdoor Motors and Motors in Outside-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).
- D. 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).
- E. Two-Position Motor: 115 V, single phase, 60 Hz.
- F. Automatic override option.

TURNING VANES:

Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Manufactured Turning Vanes: Fabricate of **1-1/2-inch- (38-mm-)** wide, curved blades set **3/4 inch (19 mm)** o.c.; support with bars perpendicular to blades set **2 inches (50 mm)** o.c.; and set into side strips suitable for mounting in ducts.

DUCT-MOUNTED ACCESS DOORS AND PANELS:

General: Fabricate doors and panels airtight and suitable for duct pressure class.

Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel. Include **1-by-1-inch (25-by-25-mm)** butt or piano hinge and cam latches.

Size: Size door to be 2-inches smaller than side of duct installed on, with a maximum size of 24- by-24-inch.

Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

Insulation: **1-inch- (25-mm-)** thick, fibrous-glass or polystyrene-foam board.

FLEXIBLE CONNECTORS:

General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric **3-1/2 inches (89 mm)** wide attached to two 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)** aluminum sheets. Select metal compatible with connected ducts.

Transverse Metal-Edged Connectors: Factory fabricated with a strip of fabric **3-1/2 inches (89 mm)** wide attached to two strips of **4-3/8-inch- (111-mm-)** wide, **0.028-inch- (0.7-mm-)** thick, galvanized, sheet steel or **0.032-inch (0.8-mm)** aluminum sheets. Select metal compatible with connected ducts.

Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.

- A. Minimum Weight: **26 oz./sq. yd. (880 g/sq. m).**
- B. Tensile Strength: **480 lbf/inch (84 N/mm)** in the warp, and **360 lbf/inch (63 N/mm)** in the filling.

FLEXIBLE DUCTS

General: Comply with UL 181, Class 1.

Flexible Ducts, Uninsulated: Corrugated aluminum.

Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing **1-1/2-inch- (38-mm-)** thick, glass-fiber insulation around a continuous inner liner.

- A. Reinforcement: Steel-wire helix encapsulated in inner liner.
- B. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
- C. Outer Jacket: Polyethylene film.
- D. Inner Liner: Polyethylene film.

Pressure Rating: 6-inch wg (1500 Pa) positive, 1/2-inch wg (125 Pa) negative.

ACCESSORY HARDWARE:

Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.

Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch (6-mm), zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches (75 to 450 mm) to suit duct size.

Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 EXECUTION

INSTALLATION:

Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.

Install volume dampers in lined duct; avoid damage to and erosion of duct liner.

Manual volume dampers are to be provided in duct runouts for all diffusers, grilles, and registers. Damper to be located at the main duct take-off. Locations where grilles and registers are mounted directly on the main duct an opposed blade damper (OBD) is to be provided.

Provide test holes at fan inlet and outlet and elsewhere as indicated.

Install fire and smoke dampers according to manufacturer's UL-approved written instructions.

- A. Install fusible links in fire dampers.

Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.

- A. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
- B. Install access panels on side of duct where adequate clearance is available.

ADJUSTING:

Adjust duct accessories for proper settings.

Adjust fire and smoke dampers for proper action.

Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION

23 36 00

AIR TERMINALS

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes the following:

- A. Fan-powered air terminals.

Related Sections include the following:

- A. Division 23 Section "Duct Insulation" for external insulation of air terminals.

SUBMITTALS:

Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories for each model indicated. Include a schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished.

Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

- A. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

Maintenance Data: List of parts for each type of air terminal and troubleshooting maintenance guide to include in the maintenance manuals specified in Division 1.

QUALITY ASSURANCE:

Product Options: Drawings and schedules indicate requirements of air terminals and are based on specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Listing and Labeling: Provide electrically operated air terminals specified in this Section that are listed and labeled.

- A. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
- A. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

NFPA Compliance: Install air terminals according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

Comply with NFPA 70 for electrical components and installation.

PART 2 PRODUCTS

MANUFACTURERS:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering air terminals that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide air terminals by one of the following:

- A. Nailor.
- B. Krueger.
- C. Titus.
- D. Tuttle & Bailey.

FAN-POWERED AIR TERMINALS:

Configuration: Volume-damper assembly and fan in series or in parallel arrangement inside unit casing. Locate control components inside protective metal shroud.

Casings: Steel sheet metal of the following minimum thicknesses:

- A. Upstream Pressure Side: 0.0239-inch (0.6-mm) steel.
- B. Downstream Pressure Side: 0.0179-inch (0.45-mm) steel.

Casing Lining: Minimum of 1/2-inch- (13-mm-) thick, neoprene- or vinyl-coated, fibrous-glass insulation; 1.5-lb/cu. ft. (24-kg/cu. m) density, complying with NFPA 90A requirements and UL 181 erosion requirements. Secure lining to prevent delamination, sagging, or settling.

Plenum Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.

Plenum Air Outlets: S-slip and drive connections.

Access: Removable panels to permit access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.

Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings.

- A. Maximum Damper Leakage: 3 percent of nominal airflow at 3-inch wg (750-Pa) inlet static pressure.
- B. Damper Position: Normally open.

Fan Section: Galvanized-steel plenum, acoustically lined, housing direct-drive, forward-curved fan with EC motor, air filter, and backdraft damper.

- A. Isolation: Fan-motor assembly on rubber isolators.

Hot-Water Heating Coil: 1/2-inch (13-mm) copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig (1380 kPa); and factory installed.

Factory-mounted and -wired controls: Mount electrical components in control box with removable cover. Incorporate single-point electrical connection to power source.

- A. Factory-mounted transformer for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
- B. Wiring Terminations: Fan and controls to terminal strip, and terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box sized according to NFPA 70.
- C. Disconnect Switch: Factory-mounted, fused, disconnect switch.

Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

SOURCE QUALITY CONTROL:

Testing Requirements: Test and rate air terminals according to ARI 880, "Industry Standard for Air Terminals."

Identification: Label each air terminal with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

PART 3 EXECUTION

INSTALLATION:

Install air terminals level and plumb, according to manufacturer's written instructions, rough-in drawings, original design, and referenced standards; and maintain sufficient clearance for normal service and maintenance.

Connect ductwork to air terminals according to Division 23 ductwork Sections.

CONNECTIONS:

Install piping adjacent to air terminals to allow service and maintenance.

Hot-Water Piping: In addition to requirements in Division 15 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

Electrical: Comply with applicable requirements in Division 16 Sections.

Ground equipment.

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

FIELD QUALITY CONTROL:

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

CLEANING:

After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

COMMISSIONING:

Verify that installation of each air terminal is according to the Contract Documents.

Check that inlet duct connections are as recommended by air terminal manufacturer to achieve proper performance.

Check that controls and control enclosure are accessible.

Verify that control connections are complete.

Check that nameplate and identification tag are visible.

Verify that controls respond to inputs as specified.

END OF SECTION

23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

PART 1 GENERAL

RELATED DOCUMENTS:

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

SUMMARY:

This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

Related Sections include the following:

- A. Division 23 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
- B. Division 23 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

DEFINITIONS:

Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

Register: A combination grille and damper assembly over an air opening.

SUBMITTALS:

Product Data: For each model indicated, include the following:

- A. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
- B. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
- C. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
- D. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

QUALITY ASSURANCE:

Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 PRODUCTS

MANUFACTURERS:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to those listed on the plans.

MANUFACTURED UNITS:

Diffusers, registers, and grilles are scheduled on Drawings.

SOURCE QUALITY CONTROL:

Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 EXECUTION

EXAMINATION:

Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION:

Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

ADJUSTING:

After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

CLEANING:

After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

SECTION 26 05 00 - BASIC METHODS AND REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

- A. The General Conditions, Supplementary General Conditions, General Requirements, and Special Conditions shall be and are hereby made a part of this Section of the specifications.
- B. In case of conflicts between the electrical drawings and Division 16 of these specifications, the more stringent requirements shall govern. In all cases, notify the Engineer for direction.
- C. The requirements of SECTION 26 05 00 - BASIC METHODS AND REQUIREMENTS establish minimum requirements, apply to, and are hereby made a part of all sections of Division 26, 27, 28 of this specification.
- D. The Contractor shall be responsible for excavation of all earth, soil, and rock conditions at the site. Review the elevations and soil boring logs and include all associated costs.
- E. Unless noted otherwise on the Drawings, or elsewhere in Division 26, 27, 28 Specifications, the singular words 'Provide', 'Furnish', or 'Install' noted on the drawings or in these Specifications shall mean to completely furnish, install, and connect each item, and if such is a part or component of a system the entire system shall be functional with all items and components provided. Unless noted otherwise on the Drawings, or elsewhere in Division 16 Specifications, any reference to 'wiring' noted on the drawings or in these Specifications shall mean both raceways and conductors or cables.

1.2 DESCRIPTION:

- A. The electrical work shall include all labor, materials, tools, transportation, equipment, services and facilities, required for the complete, proper and substantial installation of all electrical work shown on the plans, and/or outlined in these specifications. The installation shall include all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings but which are necessary to make a complete working installation of all electrical systems.
- B. All of the electrical related work required for this project (unless specified otherwise) is a part of the Electrical Contract price but is not necessarily specified under this division of the specifications or shown on the electrical drawings. Therefore, all divisions of the specifications and all drawings shall be consulted.
- C. The floor plan drawings are schematic only and are not intended to show the exact routing of raceway systems between devices, lighting, and equipment unless dimensions are noted on the drawings. Routing of raceways overhead or below floor shall be as shown on the drawings, unless approved otherwise by the Engineer. Final routing of raceway systems between devices, lighting,

and equipment will be governed by field conditions (structural members, mechanical equipment, ductwork, etc.) and shall be determined by the Contractor and approved by the Architect. Any changes in routing shall not change the design of the raceway system.

- D. The floor plan drawings showing device and equipment locations are schematic only and are not intended to show exact locations unless dimensions are noted on the drawings. The Contractor shall review all contract drawings that may affect the location of devices and equipment to avoid possible interference and permit full coordination of all work. The right to make any reasonable change in location within 6'-0", is reserved by the Architect up until the time of rough-in at no extra cost.
- E. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of transformers, cable, switchgear, panelboards, motor control, and other items, arrangement for specified items in general are shown on drawings.
- F. Electrical service entrance equipment (arrangements for temporary and permanent connections to the power company's system) shall conform to the power company's requirements. Coordinate fuses, circuit breakers and relays with the power company's system, and obtain power company approval. Provide all required temporary building power and lighting. Remove when finished. Installation of temporary power and lighting shall comply with N.E.C. and OSHA requirements.
- G. Ampacities specified or shown on the drawings are based on copper conductors, with EMT conduit accordingly sized. If other conduit or raceway types are used, adjust conduit or raceway sizes accordingly.
- H. This Contractor shall coordinate his work under this division of the specifications with the work of other trades wherein it may be interrelated. His work shall be done in such an order that there will be no interference in installing, nor delay in completion, of any part or parts of each respective trade, thereby permitting all construction work to proceed in its natural sequence without unnecessary delay.
- I. Before submitting his bid, the Contractor shall familiarize himself with the rules of all governing bodies having jurisdiction and shall notify the Architect in submitting his bid, if in his opinion, any work or material specified is contrary to such rules. Otherwise, the Contractor shall be responsible for the approval of all work and materials and, in case the use of any material specified is not permitted, a substitute shall be approved by the Engineer and shall be provided at no increase in cost.
- J. The drawings have been prepared to cover all electrical work under this contract. The Contractor is referred to all other contract drawings to guide him in the proper installation of his work.
- K. The Contractor shall fully familiarize himself with the floor drawings, elevations, details of construction, feeders, fixtures, conduit, wiring, service, etc., insofar as it may affect the installation of the work under this specification in order that all necessary materials and labor may be provided

even though not specifically referred to on the drawings or called for in the specifications.

- L. As the drawings are generally diagrammatic, the final layout of the work shall be subject to the approval of the Architect but the Contractor shall be responsible without increase in contract price for the coordination of all work under various divisions of the specifications.
- M. This Contractor shall confer with other Contractors installing work which may affect his work and must arrange his conduit, etc., in proper relation to such work. Any damage resulting from his neglect to do so must be paid for by the Contractor.
- N. Where necessary to fit and center with paneling of ceilings and wall spaces, the Contractor must, at his own expense, shift the lighting outlets or other outlets as required by the Architect.
- O. All outlets shall be set in such a manner as to finish flush with wall and ceiling lines unless marked to be exposed or surface mounted on the drawings. The height of brackets, switches, outlets, etc., are to be as directed.
- P. The Electrical Contractor shall confirm the exact electrical requirements for all equipment supplied by others and installed or connected by the Electrical Contractor. The specific work performed for the installation of any equipment shall be in conformance with the requirements established by the shop drawings of the equipment supplied. In the event the shop drawings establish requirements distinctly different than the requirements shown in the contract documents, the Contractor shall be entitled only to an adjustment of the difference between the work shown and the work required with full credit for labor and materials shown on the original drawings.
- Q. The Electrical Contractor shall provide all trenching and backfilling for underground conduits. Unless noted otherwise in other divisions of these specifications, all trenches shall be backfilled and compacted with material defined by the United Soil Classification as ML or CL (silt and clay of low to medium plasticity). Compaction shall be to 90% of ASTM D698.

1.3 MINIMUM REQUIREMENTS:

- A. Codes Rules and Regulations: Execute all work under ADA, the latest rules and regulations of the National Electrical Code Standard of the National Board of Fire Underwriters, the National Fire Protection Association, and with all laws, regulations and ordinances of the County, State, City, and the Utility Company.
- B. Codes shall govern in case of any direct conflict between codes, plans and specifications; except when plans and specifications require higher standards than those required by code. Variance from the plan and specifications made to comply with code must be approved by the Architect. If approved they shall be made with no increased cost to the Owner.
- C. This Contractor shall provide and install only the brands of materials and equipment specified herein, or equipment approved by written addendum by

the Architect-Engineer as equal. All material and equipment shall be listed and labeled by Underwriters Laboratories, Inc., indicating compliance with nationally recognized standards and/or tests.

1.4 STANDARDS:

- A. All material and equipment shall be listed, labeled or certified by Underwriters Laboratories, Inc., where such standards have been established. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:
 - 1. Certified: Equipment is "certified" if:
 - a. Equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards, or to be safe for use in a specified manner.
 - b. Production is periodically inspected by a nationally recognized testing laboratory.
 - c. It bears a label, tag, or other record of certification.
 - 2. Nationally recognized testing laboratory: A testing laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.5 QUALIFICATIONS (PRODUCTS AND SERVICES):

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
 - 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 - 2. The Engineer reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will respond within two

hours of receipt of notification that service is needed. Submit name and address of service organization.

1.6 MANUFACTURED PRODUCTS:

- A. Materials and equipment furnished shall be new, of best quality and design, free from defects, of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts should be available. All items used on this project shall be free of asbestos, PCB, and mercury material.
- B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer unless indicated otherwise.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall be completely responsible for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory and Field wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The Contractor shall notify the Engineer a minimum of 15 working days prior to the manufacturer making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and re-inspection is required, the Contractor shall be liable for all additional expenses, including expenses of the Engineer.

1.7 EQUIPMENT PROTECTION:

- A. Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain. Temporary raceways shall be kept closed and all raceways shall be installed clean and free from dirt and grease.

- B. During installation, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing, operating and painting.
- C. Damaged equipment shall be, as determined by the Engineer, placed in satisfactory operating condition or be returned to the source of supply for repair or replacement.
- D. Painted surfaces shall be protected with factory installed removable heavy Kraft paper, sheet vinyl or equal.
- E. Damaged paint on equipment and materials shall be restored to the original quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.8 GENERAL WORK REQUIREMENTS:

- A. Arrange, phase and perform work to assure electrical service both temporary and permanent for buildings at all times.
- B. Coordinate location of equipment and conduit with other trades to minimize interference.
- C. Examination of Site:
 - 1. Visit the site, inspect the existing conditions and check the drawings and specifications so as to be fully informed of the requirements for completion of the work.
 - 2. Lack of such information shall not justify an extra to the contract price.
- D. Permits:
 - 1. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the execution of this work.
 - 2. Pay fees and charges for connection to outside services and use of property.
 - 3. Deliver permits and certificates to the Architect to be transmitted to the Owner.
- E. Services:
 - 1. This Contractor shall pay for all expenses, deposits, reimbursements, etc., required by the local rules and codes for the service to the buildings, complete and ready for use.
 - 2. Consult power company for their requirements and for coordinating with their installation. Contractor shall provide any work thus required beyond that indicated by drawings and/or specifications and pay for costs incurred for Utility Company to install both temporary and

permanent service to the project. All temporary wiring shall be installed per the National Electrical Code. Verify costs with Utility Co. prior to bidding. Verify complete installation and locations of pad mount or pole mount transformers with the local electric utility company and bid installation to comply with their requirements. Contractor shall provide guard posts around electrical transformers and electrical pedestals per Utility Company standards. Contractor shall provide warning tapes above primary and secondary conduits per National Electrical Code. Verify routing of primary and secondary conduits with Utility Co. prior to installation.

3. This Contractor shall consult all local departments to verify requirements and bid installation of service in accordance with local codes and Utility company rules and regulations.
4. This Contractor shall bear all expense involved for the complete telephone service conduit installation and pull wire ready for cable installation. Verify complete installation with the local telephone company and bid installation to comply with their requirements.

F. Main Service:

1. Primary: See the plans.
2. Secondary: See the plans. Voltage will be, 277/480-volt, 3-phase, 4-wire, WYE, 120/208-volt, 3-phase, 4-wire, WYE, 240-volt, 3-phase, 3 wire Delta, or 120/240-volt, 1-phase, 3 wire.

G. Responsibility:

1. This Contractor will be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through this contractor's operation.
2. Any mutilation of building finishes or equipment initiated by electrical construction shall be properly corrected by the respective finishing contractor and paid for by the Electrical Contractor.
3. The operation of the temporary power and the permanent electrical system shall be the responsibility of this Contractor until acceptance of the building by the Owner.

H. Work to be done by the General Contractor:

1. Build in all openings, sleeves, chases, etc., for conduit and equipment as established, furnished and set by this Contractor. The General Contractor shall seal or grout all openings after this Contractor has installed the conduits.
2. Build in bolts, brackets, hangers etc., for work established, furnished and set by this Contractor.

3. All concrete work required for equipment furnished and set by this Contractor including clean up pads under electrical gear, fixture bases, transformer bases, etc.
 4. Painting: All painting of electrical equipment installed in finished areas shall be done by the General Contractor. Painting will not be required on receptacles, switches, circuit breakers etc. All fixtures and exterior poles specified to be factory-primed shall be painted by General Contractor. Paint all Wiremold, exposed conduit and equipment, etc., to match final wall or ceiling colors.
 5. Provide fireproofing above fixtures located in fire rated ceilings per U.L. requirements.
 6. Pay all utility costs for operation of electrical system during construction until acceptance of building by the Owner.
- I. Work to be done by the Mechanical Contractor:
1. The Mechanical Contractor shall furnish wiring diagrams and temperature control drawings of all equipment furnished to the Electrical Contractor. (Catalog information is unacceptable, provide point to point drawings.)
 2. The Mechanical Contractor shall furnish and install all control equipment requiring connections to air, water, steam, etc., such as pneumatic electric relays, remote bulb temperature controls, solenoid valves, aquastats and pressure controls.
 3. The Mechanical Contractor shall reimburse the Electrical Contractor for any changes in system design i.e.; control or equipment which affects the Electrical Contractor. Also refer to equipment connections, controls and instrumentation in 26 05 00.
- J. Workmanship and coordination:
1. Make installation substantially as shown on the plans.
 2. Make alterations in location of apparatus or conduit as may be required to conform to building construction without extra charge.
 3. Mechanical equipment service clearances and electrical apparatus service clearances as specified in their respective manufacturer's product data shall be maintained free from conduit.
 4. Cooperate with other trades in their installation of work.
 5. Complete the installation in a workmanlike manner, completely connected and ready to give proper and continuous service.
 6. Use only experienced licensed electricians.

K. Cutting and patching:

1. Notify the General Contractor in ample time, of the location of all chases, sleeves, and other openings required in connection with the work of this contract.
2. Cutting and patching made necessary because of failure to comply with the above shall be done by the General Contractor at the expense of the Electrical Contractor.
3. When it is necessary for the Electrical Contractor to cut building materials, it shall be done in a neat and workmanlike manner meeting with the approval of the Architect and by the mechanics of the particular trade involved.
4. Holes through concrete shall be carefully drilled with a "Concrete Termite" drill. A Star Drill or Air Hammer will not be permitted. Structural members shall not be cut without approval from the Architect.
5. Any penetrations through the roof shall be made with "Stoneman" flashing connections as manufactured by Stoneman Engineering and Manufacturing Co., Inglewood, Calif., or as approved by the Architect.
6. Any penetrations made in exterior or basement foundation walls shall be sealed with Thunderline "Link-Seal" connections, as manufactured by Thunderline Corporation, Wayne, Michigan.
7. Any holes or voids created in floors, ceilings and walls, including any spaces or gaps around conduit or equipment passing through such areas, which compromise the applicable rating of the floors, ceilings or walls, shall be sealed with an intumescent material equal to "3M Fire Barrier Caulk, Putty or Strip Sheet", "Carborundum Fiberfrax Fyre Putty", "Tremco X-ferno Fire Products", or "Rectorseal Metacalk". Material equal to the above and meeting U.L. 1479 may be used. All installations shall be per manufacturer's exact instructions.

L. Manufacturers instructions:

1. Apply, install, connect, erect, use, clean, and condition articles, materials and equipment as directed by the manufacturer.

M. Temporary electrical:

1. Make arrangements with electric utility for temporary service.
2. Provide materials, equipment, labor to install, modify, maintain (and upon completion of project, remove) safe temporary electrical power and lighting systems per OSHA standards and NEC requirements.
3. Provide sufficient capacity for construction tools, equipment, temporary ventilation and lighting.

4. Distribute systems throughout building and construction area of site such that an extension cord no longer than 100' will reach any work area. Open branch systems permitted where permitted by the National Electrical Code and OSHA. Provide temporary services to all construction offices as required.
5. Employ permanent systems as they are completed and available.
6. Provide metering of temporary service. All temporary utility costs will be paid by the Contractor.
7. All temporary electrical services shall be removed within 30 days after completion of the building, or 30 days after the premises are used or occupied for which the temporary permit was issued.

N. Demolition:

1. Where remodeling and renovation work is a part of the project, the following shall apply, unless noted otherwise on the drawings:
 - a. All items noted to be removed shall be removed complete back to point of supply including conductors and exposed lengths of conduit and raceways. Any raceways removed that are routed into the floor shall be cut off flush with the floor surface and the floor patched for a flat smooth floor surface. All items to remain on circuits where other items are noted to be removed shall be re-circuited as required to maintain continuity of circuit or system. All light fixtures, equipment, receptacles, devices, fire alarm and nurse call devices, door security devices, and sound system devices noted to be removed and not relocated shall be offered to the Owner. If the Owner elects not to retain these items, they shall become Contractor salvage and shall be removed from the job site. The Contractor shall remove from the job site all other items noted to be removed (verify all items with Owner). Where existing flush mounted devices are noted to be removed from walls to remain, remove device, coverplate, and conductors and install blank cover plate over flush backbox. Electrical Contractor shall remove existing coverplates for all existing devices to remain in remodeled and renovated areas that will receive new wall finishes and reinstall cover plates after new wall finishes are complete. All existing light fixtures and devices not shown or indicated otherwise on the drawings in existing areas are to remain.
 - b. Electrical Contractor shall remove all existing light fixtures, devices and wiring from all existing walls, partitions, and ceilings to be removed, and shall remove all existing light fixtures and wiring in rooms where new lighting is shown, unless noted otherwise on the drawings.
 - c. Electrical Contractor shall review all specifications and all drawings to coordinate installation of new equipment and

devices of other trades with existing conditions. Remove and relocate existing raceways, conductors, and boxes as required for installation of new equipment or devices.

- d. Schedule all downtimes associated with any new service revisions a minimum of one (1) week prior to interruption of services. No interruptions of any electrical work shall be made without prior consent of the Owner. Contractor shall submit to the Owner a schedule of downtimes for the Owners review and approval.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS:

- A. The Contractor shall obtain from the Architectural and Structural drawings the exact location and size of spaces available for his apparatus and material and shall install them accordingly. In case the space allowed is not sufficient, or an obstruction interferes with placing them as shown or specified, the Contractor shall obtain instructions from the Architect and shall install them as directed without extra charge. These provisions refer only to exactness of positions that cannot be determined from the drawings and do not permit placing apparatus distinctly different from that shown on the drawings.
- B. Working spaces shall not be less than specified in the National Electrical Code for all voltages specified.
- C. Inaccessible Equipment:
 1. Where the Engineer determines that the Contractor has installed equipment without proper clearances or not readily accessible for operation and maintenance, equipment shall be removed and reinstalled as directed at no additional cost to the Owner.
 - a. Install access panels as approved by the Architect to provide access to all equipment, J-boxes and outlets located in non-accessible spaces. Panels shall be flush locking type with a fire rating equal to the ceiling system.
 2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and ductwork. Outlet and box covers shall be removable by using regular length (8") screw drivers.
- D. Distribution Equipment:
 1. All items of Electrical Distribution Equipment (switchboards - panelboards - disconnects) shall be of one manufacturer, unless specifically noted on the drawings, in the specifications, or approved by written addendum by the Engineer. Intermixing of distribution equipment by different manufacturers will not be permitted.
 2. If shown on the drawings, provide a surge arrester for lightning protection on each service entrance for each building. Refer to

drawings for voltage and phasing of service. Arrester shall be located within or adjacent to the main switch, panel or switchboard enclosure and connected with 12" maximum leads. Surge Arrester shall be equal to Current Technology SEL200-DM-L3 Series.

3. Equipment layouts on the drawings are based on one manufacturer. Verify all actual equipment sizes with equipment manufacturer prior to bidding.
4. If layout changes are required due to differing electrical manufacturers equipment size, they must be submitted to and approved by the Engineer. National Electric Code working clearances must be maintained at all times. Extra remuneration will not be allowed for layout changes that differ from those shown.
5. Provide and install all steel supports as required for mounting of electrical equipment.
6. Anchor all free standing electrical equipment including switchboards, switchgear, substations, motor control centers, paralleling gear, transfer switches, transformers, etc. to the floor with plated, 1/2" diameter minimum, anchor bolts or as recommended by the manufacturer.

1.10 EQUIPMENT CONNECTIONS, CONTROLS AND INSTRUMENTATION:

- A. General: The following applies to all electrical power and control connections for all equipment requiring electrical installation work provided by others.
- B. The Electrical Contractor shall furnish, install and connect all wiring, conduit, boxes, toggle switches, thermal switches, disconnect switches, remote push-button stations not included in magnetic starters, etc., for all equipment requiring electrical power that is furnished by other contractors and/or the Owner, as required for a complete and operating system. The Electrical Contractor shall receive, install and connect all magnetic starters and controllers, capacitors, power factor correction devices, transformers, alarms, bells, horns, relays, remote switches, etc., for equipment supplied by others, (i.e. starters, capacitors or power factor correction devices for mechanical equipment, etc.). In general all major equipment will be specified to be factory prewired with only service and interlocking required at the site by the Electrical Contractor; however he shall check all divisions of the specifications to verify if the equipment is specified factory prewired and if not, then it shall be the responsibility of the Electrical Contractor to provide the complete wiring of the equipment in accordance with wiring diagrams, and temperature control drawings provided by the other contractors and/or the Owner, to the Electrical Contractor. All interlocking of equipment shall be by the Electrical Contractor.
- C. All line and low voltage wiring and connections required to control the equipment and/or dampers are a part of this section. All wiring shall be in conduit. Provide and install line or low voltage wiring to all dampers as required for system operation. All low voltage wiring, conduit, connections

and/or terminations are by the Electrical Contractor unless specifically noted otherwise within the bidding documents.

- D. The Electrical Contractor shall provide to each Mechanical Control Panel a 120 volt control power supply; #12 Ga. CU. THHN/THWN in 1/2"C. minimum at all points required by controls, instrumentation and sprinkler risers. Circuit as shown on the plans or to the nearest 120 volt panel if no circuiting is indicated. Provide 20 Amp. breakers unless otherwise indicated. Each control panel shall be on a separate circuit unless otherwise indicated. If the controlled equipment is fed from the emergency system, then the control power supply must feed from the emergency system. Electrical Contractor to provide at each Mechanical Control Panel a telephone outlet and conduit as described in Section 27 05 00.
- E. The Contractor shall become familiar himself with the equipment to be furnished by the other Contractors and/or the Owner in connection with this work and include provisions for such connections and work in the Contractor's price. Extra remuneration will not be allowed for such work.
- F. Connections to all equipment have been designed from units as specified on the drawings or in the specifications. In the event equipment or control differs on approved shop drawings it shall be the responsibility of the Supplying Contractor to coordinate electrical connections to the units and reimburse Electrical Contractor for any changes in system design. These changes shall not involve additional cost to the Owner.
- G. Review all plans, specifications, and approved shop drawings of all trades to verify all equipment connections that are required by mechanical and/or other contractors. Although the electrical drawings will show equipment connection requirements, it is the Electrical Contractor's responsibility to connect all equipment furnished by other Contractor's at no extra cost to the Owner, even if this equipment connection is not shown on the electrical drawings. Coordinate all required connections not shown on the electrical drawings with the Engineer.
- H. Electrical Contractor to provide and install all boiler remote shut down switches and chiller remote shut down switches as required by Codes. Connect to equipment as required. Install nameplates at switches indicating use. Mount switches at 4'-0" AFF.
- I. Service receptacles and disconnect switches mounted on mechanical equipment shall be located as not to obstruct access doors to equipment. Provide weatherproof-in-use covers on receptacles at exterior HVAC units, whether or not the receptacles are furnished with the equipment.

1.11 NAMEPLATES:

- A. General: The following items shall be equipped with nameplates:
 - 1. Disconnect switches (fused or nonfused), transformers, switchgear, switchboards, panelboards, separately mounted circuit breakers, starters, contactors, relays, junction boxes and pull boxes.

2. Special Electrical Systems (fire alarm, sound system, emergency system, etc.) shall be so identified at junction and pull boxes, terminal cabinets and equipment racks with a permanent, waterproof means of identification. (Example – FIRE ALARM). Free hand lettering or adhesive tape type label markers will not be acceptable.
 3. Wall switches or other control devices controlling equipment or special lighting configuration shall have either engraved wall plates or shall be provided with engraved nameplates.
 4. All devices on the emergency system shall be 'Red' with coverplates to match remainder of devices in the building. Coverplate to be engraved with panel name and circuit number.
- B. Inscription: Nameplates shall adequately describe the function or use of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage, phase, A.I.C. rating of the devices, color coding of conductors, and location and breaker that panel is fed from. (See schedules, one-line diagram, and conductor color coding). For example, "Panel A 120/208 V, 3-Phase, 4-Wire, 10,000 A.I.C. Phase A: Black, Phase B: Red, Phase C: Blue, Neutral: White, Ground: Green, Fed From Panel MDP", Breaker #1.

The name used for a machine nameplate shall be the same as the one used on the machine's motor starter, disconnect and P.B. station nameplates. Nameplates for fused switches and panels shall also indicate fuse type and size. All panelboards fed from the emergency system shall be labeled "Emergency System", in addition to the instructions listed above.

- C. Construction: Nameplates shall be laminated phenolic plastic white front and back with black core. Nameplates for emergency system panelboards and transfer switch shall be laminated phenolic plastic red front and back with white core. Lettering shall be engraved through front layer to form 1/4" black characters. Nameplates shall be securely fastened to the equipment to be identified, with No. 4 Phillips, round head, cadmium plated, steel self tapping screws or nickel plated brass bolts. Motor nameplate may be nonferrous metal not less than 0.03 inches thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Letters engraved thus, shall be filled with contrasting enamel. All nameplates and their installation are part of this work. Free hand lettering or Dymo Label marker will not be acceptable.

1.12 MATERIALS OF APPROVED EQUAL:

- A. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model or catalog number, only such specific items may be used in the base bid, except as hereinafter provided.
- B. Unless requests for changes in base bid specifications are received, approved and noted by written addendum prior to the opening of bids, the successful contractor will be held to furnish specified items.

- C. After contract is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment".

1.13 SUBSTITUTION OF EQUIPMENT:

- A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents, may be approved by the Engineer, only if the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence and due to conditions beyond control of the Contractor. Provide documentary proof in writing from the manufacturer that the specified equipment will not be available in time. If the Contractor is responsible for the delay, the substitution will not be approved.
- B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.
- C. The Owner shall receive all benefits of the difference in cost involved in any substitution, and the contract altered by change order to credit Owner with any savings so obtained.

1.14 SUBMITTALS:

In accordance with Section SAMPLES AND SHOP DRAWINGS, Contractor shall, within 15 days after award of contracts, begin sending to the General Contractor for review submittals containing the following:

- A. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- C. Submittals shall be complete and submitted together for each section. Individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assemble as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_____". Mark out all statements on sheets that do not apply otherwise. The Engineer may select options and equipment not originally specified. All options that are not marked out will be assumed that the Contractor will furnish the same.
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.

4. Mark catalog cuts to indicate equipment, capacities, finishes, sizes, etc. Each individual item shall have its own sheet provided for approval. (Example: Separate sheets for each panelboard.)
- D. The submittals shall include the following:
1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 4. Quantities of materials will not be verified by the Architect or Engineer. Review stamp on shop drawings does not constitute review of quantities listed on shop drawings.
 5. Shop drawings:
 - a. All shop drawings shall be checked and signed by this contractor and general contractor prior to submittal to the Architect/Engineer. Equipment, materials, etc., not meeting specifications and/or drawing requirements shall be returned to the supplier for corrections before they are submitted to the Architect-Engineer. This Contractor is reminded that only those materials specified, approved or otherwise indicated by the project specifications, drawings, or addenda will be permitted to be used in constructing the electrical work for this project. The first review of submittals (shop drawings) will be provided as indicated at no charge to the Contractor. However, subsequent review(s) of resubmittals required by "Rejected" status from the original review will necessitate the Electrical Contractor being charged by the electrical consultant a fee of \$65 per man-hour, with a minimum charge of \$100 for each item resubmitted. It is intended that all electrical submittals be made in a complete and timely fashion such as to permit a comprehensive and thorough review of same.
 - b. Shop drawings submitted without Contractor's signatures or approval and verification will not be approved.
 - c. Shop drawings shall be submitted on wire, cables, devices, lighting fixtures (including distribution curves), motor starters, panelboards, disconnects, substations, transformers, switchgear, switchboards, motor control centers, conduit, raceway systems, all systems, etc.

6. Each sheet shall be either 8 1/2" x 11"; 8 1/2" x 13"; or 11" x 17" bond with a 5" x 3" clear area for engineer's stamp. (This area shall not be used by this contractor or the general contractor's stamp.) Larger drawings shall be able to be blue printed.
 7. Submittals for all systems (fire alarm, security, PA, controls, sound, clock, nurses call, intercom, etc.) shall include complete riser diagrams showing all conductors and conduit sizes.
- E. Engineer's acceptance of Compliance Submittals will not relieve the Contractor from his responsibility for any deviations from the requirements of the contract documents, unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and the Engineer has given written approval to the specific deviation; nor shall any acceptance by Engineer relieve Contractor from responsibility for errors or omissions in Compliance Submittals.
- F. Quantity of Submittals: See the general specification sections.

1.15 ELECTRICAL WORK COMPLETION:

- A. Before requesting final inspection the following work must be completed.
- B. Operating Instructions:
1. The Contractor shall submit along with the shop drawings of the equipment, four (4) copies of operating instructions for all items. Instructions shall be prepared by the manufacturer of the equipment.
 2. After the operating instructions have been approved by the Engineer, the Contractor shall include the four (4) copies in maintenance instructions brochures.
 3. The Contractor shall also obtain all manufacturer's instructions, manuals, and one complete set of drawings and turn these over to the Architect at the completion of the project.
 4. The Contractor shall keep in a safe place, all keys and special wrenches furnished with equipment under this contract and shall give same to the Architect at the completion of the project.
 5. The Contractor shall prepare four (4) complete brochures covering all systems and equipment furnished and installed under his contract. Brochures shall be submitted to the Architect-Engineer for approval and delivery to the Owner. The Engineer will retain one copy. The cost of this brochure shall be included in the contract cost. Brochures shall contain the following:
 - a. Certified equipment drawings and/or catalog data clearly marked for equipment furnished as required for approval submission under detailed section of the specifications.

- b. Complete operating and maintenance instructions for each item of equipment.
 - c. Complete part list for each equipment item.
 - d. Any special emergency operating instructions or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
 - e. Reviewed shop drawings with reviewed stamp of Engineer.
 - f. System test reports.
6. Brochures shall be bound in hard backed three ring binders with an index, sub-dividers and reinforced sheets.
- a. Project name, and address, and date of submittal.
 - b. Section of work covered by brochure, i.e., "Electrical Work".
 - c. Name and address of Architect.
 - d. Name and address of Engineer.
 - e. Name and address of Contractor.
 - f. Telephone number of Contractor, including night or emergency number.
7. In addition to these written instructions, each respective Contractor shall fully and carefully instruct the Owner, or Owner's selected representatives, as to the proper operation, care and maintenance of each system and its equipment.
8. Fire Alarm, Security, Sound, PA, Clock, etc., Systems: The manufacturer shall conduct and record a device by device test. Verify completely proper operation. Record all items checked for each device and device location on a form. Submit this final checkout form to the Engineer.

1.16 TESTING AND ADJUSTMENT:

- A. All equipment shall be checked for proper adjustment and balance. All panelboards, distribution panels, switchboards, and transformers shall be balanced to provide a balanced load on each phase. A complete record of all such adjustments shall be made. Final readings shall be submitted to the Architect-Engineer for records. The Contractor shall provide all equipment, instruments, gauges, meters, etc., as required for the complete checking of these systems.
- B. Mechanisms of all electrical equipment shall be checked, adjusted, and tested for proper operation. Adjustable parts of all lighting fixtures and other electrical equipment shall be checked, adjusted, and tested as required to produce the intended performance.
- C. Completed wiring system shall be free from open or shorted circuits. After completion, this Contractor shall perform tests for insulation resistance in accordance with the requirements of the National Electrical Code.
- D. The Contractor shall maintain service and equipment for the testing of electrical equipment and apparatus until all work is approved and accepted by

the Owner. A first class voltmeter and ammeter shall be kept available at all times and this Contractor shall provide service for test readings when and as required. All test readings shall be recorded on an approved form and submitted to the Architect.

- E. Before final acceptance is made, this Contractor shall, at his own expense, frame under plastic the sequence of operations of the sound system, controls, fire alarm, etc., for each and every item requiring instructions. These instructions shall be mounted as directed. He shall cover same with Engineer and/or his selected parties, and shall adjust all apparatus and place same in satisfactory operating service as approved by the Engineer.
- F. Final observation will be made upon written request from the Contractor after the project is complete. At the time of final observation, the Contractor shall be present or shall be represented by a person of authority. The Contractor shall demonstrate, as directed by the Architect-Engineer, that his work fully complies with the purpose and intent of the drawings and specifications. All labor, services, and all instruments or tools necessary for such demonstration and tests shall be provided by the Contractor.

1.17 AS-BUILT DRAWINGS:

- A. E.C. shall prepare and submit to the Engineer, upon completion of the project, one complete set of reproducible "As Built" drawings for the electrical portion of the project.
- B. Drawings shall clearly indicate any and all approved deviations (i.e. addendum items, change order data, etc.) from the Project Bid Documents.
- C. These drawings will become the property of the Owner and will be for his future reference file, record document.

1.18 FINAL OBSERVATION:

- A. Final observation will be made upon written request from the General contractor after the project is completed; in accordance with the Supplementary General Conditions.
- B. Furnish a workman familiar with this project to accompany the Engineer on final observation and have available ladders, drop cords, and other equipment as required to gain access to any portion of this system.
- C. This Contractor and his principal subcontractors shall be represented at the inspection by a person of authority responsible to demonstrate to the engineer that his work conforms to the intent of the plans and specifications.
- D. Extra observations made necessary by the Electrical Contractor's failure to comply with the conditions as set forth above shall be charged to the Contractor for the Inspector's time both on the job and spent in travel between the office and the project site.

1.19 GUARANTEE:

- A. This Contractor, by the acceptance of this specification and the signing of his contract, acknowledges his acquaintance with the requirements and guarantees that every part used in constructing the system as herein described will be of the best of its respective kind that can be obtained and will be erected in a most thorough and substantial manner by none but experienced workmen.
- B. He guarantees that all conduit as provided within and by this specification will be free from all obstructions of every description and will be free from holes or broken places and be well bonded together. He guarantees that all wiring and conduit to be used in construction of this project will be new and unused.
- C. He further guarantees to hold himself responsible for any defects which may develop in any part of the entire system, including apparatus and appliances provided under this section of the specification, and to replace and make good without cost to the Owner any such faulty parts of construction which develop defects at any time within one year from date of final certification of completion and acceptance. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to the Owner's satisfaction, advise Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Architect will then suggest course of action. The Electrical Contractor shall replace material and equipment that requires excessive service during guarantee period as defined and as directed by the Architect. This guarantee does not include ordinary lamp failure.
- D. Use of systems provided under the Specification for temporary services and facilities shall not constitute Final Acceptance of the work nor beneficial use by the Owner, and shall not institute guarantee period.

1.20 SINGULAR NUMBER:

- A. Where any device or part of equipment is referred to in these specifications or on the drawings in the singular number (such as "the switch"), such reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.21 PERFORMANCE:

- A. Provide as part of the work of this contract, in addition to the first year guarantee on equipment and materials, the following described routine maintenance and inspection. (The one year time period will not start until each and every item is complete in accordance with drawings and specifications and accepted by the Owner). Check all emergency systems, control, fire alarm, transformers, etc., correct and adjust same. This service to be provided during the guarantee period.

1.22 SYSTEM:

- A. System: Distribution characteristics shall be as indicated on drawings.

1.23 SUPPLEMENTARY CONDITIONS:

- A. Supplementary to all other terms of the contract, this work shall be performed subject to the following conditions.
- B. Materials and equipment installed on this project shall be first class in quality and shall be new and unused.
- C. Workmanship on this project shall be first class work performed by the experienced licensed mechanics of the proper trade.
- D. Work under this contract shall be adequately protected at all times. Storage, parking, signs, advertisement, fires and smoking shall conform to all applicable regulations and/or directions of the Architect.
- E. Measurements on job and shop layouts required for installation of work shall be the responsibility of the contractor and acceptance of work is subject to approval of shop drawings by the Architect.
- F. Contractor shall furnish all hoists, scaffolds, staging, runways and equipment necessary for the completion of this work.
- G. Obtain and pay for all required electrical permits and licenses.
- H. Maintain lights and guards required for safety.
- I. Remove temporary service after use.

1.24 CONTRACT CHANGES:

- A. All changes or deviations from the contract, including those for extra or additional work, must be submitted in writing for the approval of the Architect/Engineer. No verbal orders will be recognized.

1.25 RUBBISH/CLEANUP:

- A. All rubbish resulting from the work herein specified shall be periodically removed by this Contractor.
- B. Clean all electrical equipment and materials of all foreign matter (both inside and out). Clean all light fixtures using only methods and materials as recommended by the manufacturer.

1.26 PROPOSALS:

- A. The Contractor shall consult the General Conditions and the Proposal Form for proposals and subdivisions of the work required.

1.27 EXTENT OF WORK:

- A. The extent of the work under this heading of the contract shall be the furnishing of all plant, labor, materials, and equipment as required to

complete work as shown on the drawings and as specified under this heading, and all plant, labor, materials and equipment not shown on the drawings or specified, but necessary to make installation complete in accordance with the intent of the contract, to provide first class, complete, and operative installation throughout.

1.28 TAXES:

- A. Contractor shall include all applicable local, state and federal taxes in his bid. Consult the Supplementary Conditions of these specifications relative to any and all tax exemptions permitted for this project.

END OF SECTION 26 05 00

SECTION 26 05 13 - WIRES AND CABLES, LOW VOLTAGE

PART 1- GENERAL

1.1 DESCRIPTION:

- A. This section includes the furnishing, installation, and connection of the power, lighting, system, and control wiring.

PART 2 - PRODUCTS

2.1 CABLE AND WIRE (POWER AND LIGHTING):

- A. Cable and Wire: Fed. Spec. J-C-30, except as hereinafter specified. All conductors shown on plans are sized for copper unless noted otherwise. UL label required. American, Southwire, Essex, or equal, rated 600 volts, finished with fadeless color coding and bearing Underwriters label.

All cable and wiring shall be continuous between electrical equipment. Splices shall not be added except as required for taps in branch circuits or as approved by the engineer. No splices will be allowed within panelboards and switchboards.

- B. Single Conductor:

1. Soft annealed copper.
2. All conductors #8 gauge and larger shall be stranded unless noted otherwise. All conductors #10 gauge and smaller may be solid or stranded unless noted otherwise on the drawings. Stranded conductors may be used only on devices and lugs that are U.L. listed for use with stranded conductors.
3. Minimum size No. 12, except where larger sizes are shown. (Size No. 14 minimum for controls).

- C. Insulation:

1. Wires for general use within the building shall be type THHN or type THWN, 90 degree rated except where called for otherwise on the drawings. Type THHN or type THWN shall be used at the temperature rating of equipment termination lugs, environmental conditions, and as Code allows. Wires for other than general use shall be as hereinafter specified for specific services.

- D. An equipment grounding conductor, sized per NEC Article "Grounding", shall be installed in each conduit containing phase conductors.

E. Color Code:

1. All conductors shall be identified by circuit number and color coding at all termination points and splices. All conductors shall be identified in all pull and junction boxes by the following method of color coding. Means of identification shall be permanently posted at each branch circuit panel with a nameplate identifying color coding system used in that panelboard.

Phase	208/120V	480/277V	240V.	240/120V
A	Black	Brown	Black	Black
B	Red	Orange	Red	Red
C	Blue	Yellow	Blue**	
Neutral	White	Gray*		White
Ground	Green	Green	Green	Green
Iso. Grd	Green w/Yellow	Green w/Yellow	Green w/Yellow	Green w/Yellow

* or white with colored (other than green) tracer.

**Identify 'High Leg' per N.E.C.

2. Use solid color compound or solid color coating for No. 6 and smaller branch circuit conductors and neutral sizes.
3. Phase conductors No. 4 and larger color code using one of the following:
 - a. Solid color compound or solid color coating.
 - b. Colored as specified using 3/4-inch wide tape. Apply tape in two layers, half overlapping turns for a minimum of three-inches for terminal points, and in junction boxes, pull boxes, troughs, manholes, and handholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable stating size and insulation type. Where any conductor is or can be supplied from an emergency system, the Contractor shall mark each conductor with an additional two layers, one-half lapped, of purple colored vinyl electrical tape.
 - c. Yellow stripe on isolated ground may be 1/4-inch wide yellow tape on top of green.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
5. Provide plastic engraved color code legend on each panelboard and switchboard per NEC Article "Branch Circuits", "Identification Of Ungrounded Conductors".
6. All improperly color coded conductors will be completely replaced at no additional cost to Owner.

- F. See riser diagrams and/or other sections of the Specifications for types and ratings for sound, fire alarm, control and other special cables.
- G. Where quantities of conductors in a raceway system are not specifically indicated, provide the number as required to maintain function, control and number of circuits as indicated.
- H. All isolated ground circuits shall be provided with separate phase, neutral, and ground conductors (no shared neutrals or grounds). All isolated ground circuits shall be installed in separate raceways from all other circuiting.
- I. Where multiple sets of conductors are indicated, do not install the same phase conductors in the same raceway. Each raceway shall be provided with A, B, C phase conductors, neutral (if indicated), and ground (if indicated).
- J. Where GFCI circuit breakers are used, provide a separate neutral conductor for the GFCI circuit. (Not a shared neutral with another circuit).

2.2 SPLICES AND JOINTS:

- A. In accordance with UL 486 A, B, D and NEC.
- B. Splices and taps for #6 and larger conductors shall be made with block type terminations (with insulating jacket) or with split bolt connectors, covered and completely insulated with a minimum of three half-lapped layers of Scotch No. 33+ (105 degree C) plastic electrical tape or by approved insulated fastener. All splices and taps having irregular surfaces shall be properly padded with Scotchfil putty before application of insulating plastic tape. Scotchlok electrical pre-insulated spring pressure connectors or equal may be used for up to #8 conductors.

2.3 CONTROL WIRING:

- A. All control wiring shall be copper, solid or stranded, #14 Ga. or larger depending upon current requirements, with insulation type for 90 C. rating. Where stranded conductors are used, provide with spade type insulated copper terminals. Unless noted otherwise on the Mechanical drawings or herein, all mechanical control wiring for all systems shall be routed within conduit, shall be of the same insulation type and shall be continuous between outlets and boxes (with no splices or taps into conduit). All line and low voltage mechanical control wiring, conduit, connections, and/or terminations are by the Electrical Contractor unless specifically noted otherwise within the bidding documents.

2.4 WIRE LUBRICATING COMPOUND:

- A. The cable pulling lubricant shall be compatible with all cable jackets. The lubricant shall be UL (or CSA) listed. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils or waxes.
- B. A 200-gram sample of the lubricant, when placed in a one-foot, split metal conduit and fully dried for 24 hours at 105 degrees C, shall not spread a

flame more than three-inches beyond a point of ignition at a continued heat flux of 40 kW/m². Total time of test shall be one-half hour.

C. Approved Lubricant is:

Dyna Blue

Polywater J available from:

American Polywater Corporation

Equal by Quick Slip from Buchanan
CCR Wire Pulling Lube from CRC
Poly-X from American Colloid.

2.5 FIREPROOFING TAPE:

- A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.
- B. The tape shall be self-extinguishing and shall not support combustion. It shall be arcproof and fireproof.
- C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.
- D. The finished application shall withstand a 200 ampere arc for not less than 30 seconds.
- E. Securing tape: Glass cloth electrical tape not less than 7 mils thick, and 3/4-inch wide.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERALLY:

- A. Install in accordance with the NEC, and as specified.
- B. Unless noted otherwise on the Electrical drawings or herein, all wiring for all systems shall be routed within conduit, shall be of the same insulation type and shall be continuous between outlets and boxes (with no splices or taps into conduit).
- C. Splices and taps in outlet boxes shall be twisted joints. U.L. approved pre-insulated spring pressure connectors shall be used for branch circuit connections. Connectors shall be installed so that all conductors are properly insulated.
- D. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes, or handholes. Do not splice cables in panelboards, switchboards, disconnects, etc.

- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, and tie all cables.
- G. Seal cable and wire entering a building from underground between the wire and conduit, where the cable exits the conduit, with a non-hardening approved compound.
- H. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
 - 2. Use ropes made of nonmetallic material for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Engineer.
 - 4. Pull multiple cables into a single conduit with a single continuous pull.
 - 5. Always use wire lubricant per this specification.

3.2 SPLICE INSTALLATION:

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Where the Engineer determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the Owner.

3.3 CONTROL, COMMUNICATION, AND SIGNAL WIRING INSTALLATION:

- A. Unless otherwise specified in other sections of these specifications, install wiring as described below. Wiring shall be connected to perform the functions shown and specified in other sections of this specification.
- B. Except where otherwise required, install a separate power supply circuit for each system, or control equipment, or control power. Circuit to nearest 120 volt panel or nearest emergency panel if equipment controlled is connected to emergency system. Provide 20 Amp breakers in panels where none are designated. Verify all requirements with actual equipment supplied in field.
- C. Install a breaker lock-on clip on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.
- D. System voltages shall not exceed 120 volts and shall be lower voltages where shown on the drawings or required by the NEC.

- E. Wire and cable identification:
 - 1. Install a permanent wire marker on each wire at each termination, outlet box, junction box, panel, and device.
 - 2. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
 - 3. Wire markers shall retain their markings after cleaning.

3.4 FIELD TESTING:

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices such as fixtures, motors, or appliances.
- B. Test shall be performed by meggar and conductors shall test free from short-circuits and grounds.
- C. Test conductors phase-to-phase and phase-to-ground.
- D. Meggar motors after installation but before start-up and test free from grounds.
- E. The Contractor shall furnish the instruments, materials, and labor for these tests.

END OF SECTION 26 05 13

SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies general grounding and bonding requirements of electrical installations.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS:

- A. General Purpose: UL and NEC approved types, copper, with THHN or type THWN, or dual rated THHN-THWN insulation color identified green, 90 degree rated.
- B. Size conductors not less than what is shown and not less than required by the NEC.

2.2 GROUND RODS:

- A. Copper clad steel, 3/4-inch diameter by 10 feet long.

2.3 SPLICES:

- A. All splices and grounding electrode connections shall be made with exothermic welds.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERALLY:

- A. Ground in accordance with the NEC as shown, and as hereinafter specified. All equipment ground conductors shall be terminated on a ground bus or ground lug attached to equipment can.
- B. System Grounding:
 - 1. Secondary service neutrals shall be grounded at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance) ground the secondary neutral.
 - 3. Individual Buildings: Bond Main Disconnect ground bus to water pipe, and driven ground. Provide bond to 20 foot re-bar in foundation or to building steel, if indicated on the drawings or required by local Codes.

C. Equipment Grounding:

1. Metallic structures, enclosures, raceways, junction boxes, outset boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents.

3.2 SECONDARY EQUIPMENT AND CIRCUITS:

- A. Main Bonding Jumper: Connect the secondary service neutral to the ground bus in the service equipment.
- B. Water Pipe and Supplemental Electrode:
1. Provide a ground conductor connection between the service equipment ground bus and the metallic water pipe system. Jumper insulating joints in the water pipe.
 2. Provide a supplemental grounding electrode and bond to the water pipe ground, or connect to the service equipment ground bar.
- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors. Connect the neutral to the ground bus (main bonding jumper).
- D. Switchgear, Switchboards:
1. Connect the various feeder green grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 2. Connect the grounding electrode conductor to the ground bus.
 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and ground conductor to the ground bus.
- E. Transformers:
1. Exterior: Exterior transformers supplying interior service equipment shall also have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest cold water pipe.
- F. Raceway Systems:
1. Ground all metallic raceway systems.

2. Raceway provided for mechanical protection containing only a grounding conductor, bond to that conductor at the entrance and exit from the raceway.
- G. Feeders and Branch Circuits: Install green grounding conductors with feeders and branch circuits in all feeders and branch circuits and in any raceway containing a phase conductor.
 - H. Isolated Grounds: All isolated grounds must be insulated and must terminate on isolated ground buses in the equipment. No other equipment grounds shall be connected to isolated ground bus. Where isolated grounds are shown and PVC conduit is used, an equipment ground must be installed to ground metallic boxes and mounting straps. Provide separate isolated ground for each circuit. (No shared ground conductors for isolated circuits).
 - I. Boxes, Cabinets, Enclosures, and Panelboards:
 1. Bond the grounding conductors to each pullbox, junction box, outlet box, cabinets, and other enclosures through which the ground conductors pass (except for special grounding systems for intensive care units and other critical units shown.).
 2. Make ground conductor connections to ground bus in motor control centers, panelboards, etc.
 - J. Receptacles and toggle switches are not approved for grounding through their mounting screws. Ground devices from the grounding conductor of the wiring system to the green ground terminal on the device.
 - K. Ground lighting fixtures to the green grounding conductor of the wiring system.
 - L. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green ground conductor.
 - M. Telephone Terminal Boards: Provide a #6 cu. ground in 3/4" c. from each board to the main service disconnect ground bus.

3.3 CONDUCTIVE PIPING:

- A. Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.

3.4 GROUNDING RESISTANCE:

- A. Grounding system ground resistance must not exceed 5 ohms. Final tests shall assure that this requirement is met. Submit to the Engineer.
- B. Where permanent ground connections are required, make the connections by the exothermic process to form solid metal joints.

- C. Where rock prevents the driving of vertical ground rods, install grounding electrodes in horizontal trenches to achieve the specified resistance.
- D. Where more than one ground rod is required to meet the specified resistance, they shall be located at least 10 feet apart.

END OF SECTION 26 05 26

SECTION 26 05 30 - RACEWAY SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section includes the furnishing, installation, and connection of raceways, fittings, and boxes to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The terms 'conduit' or 'raceway', as used in this specification or on the drawings, shall mean any or all of the raceway types specified. The term 'surface metal raceway', as used in this specification or on the drawings, shall refer to raceway types specified in 2.1-K.

PART 2 - PRODUCTS

2.1 MATERIAL:

- A. Raceway Size: In accordance with the NEC but not less than 1/2-inch unless otherwise noted in other sections of the Specifications.
- B. Raceways: Install raceway types as shown on drawings and as listed below. No other raceway systems other than listed below will be allowed. All conduit sizes listed on the drawings are based on conductor fill in EMT conduit. If other conduit types are used, adjust conduit sizes to conform with NEC Chapter 9, Table 4.
 - 1. Rigid steel: UL 6. Rigid intermediate steel conduit (IMC): UL 1242. Rigid conduit (GRC) and intermediate metal conduits (IMC) shall be standard size, hot dip galvanized steel conduit, minimum 1/2" trade size, as manufactured by Triangle PWC, Inc., Allied, or equal. Rigid conduit and IMC shall be provided with threaded fittings and couplings. In trade sizes 2-1/2" to 4", contractor may use Allied 'KwikCouple' fittings in lieu of individual steel couplings. Where 'Kwik-Couple' fittings are used exterior for vertical risers, install fitting with taper end up. A "green" ground wire, sized per NEC 250-122, shall be installed in all conduits containing phase conductors. All conduit exposed exterior of building, in wet locations or subject to physical abuse shall be Rigid Steel or IMC.
 - 2. Electrical Metallic Tubing (EMT): U.L. 797. EMT (thinwall conduit) shall be minimum 1/2" trade size, as manufactured by Triangle PWC, Inc., Allied, or equal. Provide EMT with Thomas and Betts, or equal, U.L. listed steel or die-cast type fittings. Indenter type fittings shall not be used. Contractor may use Allied 'Kwik-Fit' fittings in lieu of individual fittings. A "green" ground wire, sized per NEC 250-122, shall be installed in all conduits containing phase conductors. EMT conduit shall not be installed in earth, in wet locations, exposed exterior to the building, subject to physical abuse, or below grade.

3. Flexible steel conduit: Fed. Spec. WW-C-566 and UL 1. Short runs (6' or less) of galvanized steel or liquid tight steel flexible conduit (flexible steel tubing covered with extruded liquid-tight jacket of polyvinyl chloride) may be used when approved by the Engineer. (Minimum 1/2" trade size.) A separate "green" ground conductor (sized per N.E.C.) shall be installed in all flexible conduits. Type AC "Armored Cable", Type MC "Metal-clad Cable", or "BX" cable shall not be used in any manor unless supplied as part of a manufactured flexible wiring system for lighting and approved by the Engineer in writing.
4. U.L. approved schedule 40 P.V.C. conduit may only be used where conduits are to be run in earth or below slabs. PVC conduits shall not be used in patient care areas (other than patient sleeping areas) above or below grade. (NEC Article 517.13 (A), 517.10 (B) (2)). These locations shall have branch circuit wiring installed in a metal raceway system, or a cable having a metallic armor or sheath assembly. P.V.C. conduits shall not be used above grade inside or outside of the building, unless specifically noted otherwise on the drawings. Use G.R.S. ells and risers, both horizontal and vertical, unless specifically noted otherwise on the drawings. Use conduit adapters when converting from P.V.C. to steel conduit. Branch circuit and feeder P.V.C. conduit to be 3/4" min. Concrete encase all conduit installed below grade where so noted on the drawings, (U.L. approved schedule 40 P.V.C. with plastic spacers). All P.V.C. conduit shall be provided with a separate "green" ground conductor, sized per N.E.C.

C. Conduit Fittings:

1. Rigid steel and IMC conduit fittings:
 - a. Standard threaded couplings, locknuts, bushings, and elbows: Fed. Spec. W-F-408, except only material of steel or malleable iron are acceptable. Integral retractable type IMC couplings are acceptable also.
 - b. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - c. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted. Bushings for conduit smaller than 1-1/4-inch shall have flared bottom with ribbed sides.
 - d. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - e. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In

concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.

- f. In trade sizes 2-1/2 inches to 4-inches for rigid steel raceway or intermediate metal raceway, contractor may use Allied 'Kwik-Couple' fittings in lieu of individual steel couplings. 'Kwik-Couple' fittings shall not be used in hazardous locations. Where 'Kwik-Couple' fittings are used exterior for vertical risers, install fitting with taper end up.
 - g. Where conduits enter boxes, they shall be rigidly clamped to the box by double locknuts and bushings. Conduit shall enter the box squarely. Bushings and locknuts shall be made of malleable iron and shall have sharp clean-cut threads.
2. Electrical metallic tubing fittings:
- a. Fed. Spec. W-F-408, except only material of steel for compression type. Steel or die-cast is acceptable for set screw type. Die-cast compression is not acceptable.
 - b. Couplings and connectors: Suitable for the installation. Use gland and ring compression type or set screw type couplings and connectors. Use concrete tight where installed in concrete. Set screw type couplings for conduit 2 inches and larger shall have four set screws each. Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
 - c. Indenter type connectors or couplings are prohibited.
3. Flexible steel conduit fittings:
- a. Fed. Spec. W-F-406 and UL 5, except only steel or malleable iron material is acceptable.
 - b. Clamp type, with insulated throat.
4. Liquid-tight flexible metal conduit fittings:
- a. Fed. Spec. W-F-406, except only steel or malleable iron material is acceptable.
 - b. Type incorporating a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
5. Expansion and deflection couplings:
- a. UL 467 and UL 514.

- b. Accommodate, 1.9 cm (0.75") deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
 - d. Shall be watertight, seismically qualified, corrosion-resistant, threaded for and compatible with rigid or intermediate metal conduit.
 - e. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.
- D. Raceway Supports:
- 1. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
 - 2. Pipe Straps: Fed. Spec. FF-S-760, Type I, Style A or B.
 - 3. Individual Raceway Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 - 4. Multiple Raceway (trapeze) hangers: Not less than 1-1/2 by 1-1/2 inch, 12 gauge steel, cold formed, lipped channels; with not less than 3/8-inch diameter steel hanger rods.
 - 5. Solid Masonry and Concrete Anchors: Fed. Spec. FF-S-325; Group III self-drilling expansion shields, or machine bolt expansion anchors Group II, Type 2 or 4, or Group VIII.
- E. Outlet Boxes:
- 1. UL-50, UL514A, Fed. Spec. W-C-586 and Fed. Spec. W-J-800.
 - 2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
 - 3. Sheet metal boxes: 4-inch square, galvanized steel, except where otherwise shown. Single gang 'Handy Boxes' will not be allowed.
 - 4. Boxes installed in concrete or masonry and boxes larger than two gang shall be masonry type.
- F. Wireways: Equip with hinged covers, except where removable covers are shown. All exterior wireways NEMA 3R. Size all wireways per National Electrical Code.

G. Pull and Junction Boxes:

1. Pull and junction boxes shall be code gauge steel boxes with hinged, bolted or screwed covers. Boxes shall be flush or surface mounted as shown or required by N.E.C and job conditions.
2. Junction and pull box shall be installed where shown on drawings and additional boxes shall be installed if required for pulling of wire provided location and installation is approved by the Architect. All boxes shall be code construction and size with screw type cover and shall be installed in accessible locations.
3. Conductors shall not be spliced within pull boxes.
4. Boxes shall be rated as shown on the drawings or as required by applicable codes, ie: raintight, weatherproof, explosionproof, etc.

H. Floor Boxes:

1. Verify exact location of all floor boxes with the architect prior to rough-in. All floor boxes shall conform to UL 514A and UL 514C scrub-water testing standards. Unless otherwise specified on the drawings or in the special outlet schedule, floor boxes shall be as follows, or equal by Walker/Wiremold:
 - a. Fully adjustable, stamped steel, concrete tight with knockouts on bottom and all four sides (1/2", 3/4" and 1" sizes) shall be Steel City #68-D or Hubbell #B-2527 deep when concrete floor thickness above any part of deck is 4-inch thick or more; and Steel City #68-S or Hubbell #2529 shallow when concrete floor thickness is 3-inch up to 4-inch.
 - b. Cover plates shall be polished brass. Steel City #P60-DS or Hubbell #S3925 hinged lift L105 for duplex receptacles, Steel City #P60 or Hubbell #S Series for single receptacles with removable plug sized to match the receptacle to be installed, and Steel City #P60-3/4-2 or Hubbell #S-88-1 for telephone, TV, microphone, and furniture feed floor boxes. Route liquitite conduit from furniture feed floor box to furniture.
 - c. Provide polished brass carpet flanges in all carpeted areas: Steel City #P60-CP or Hubbell #S-3082.
 - d. PVC floor boxes may be used in lieu of floor boxes indicated above. PVC floor boxes shall be equal to Walker, Wiremold, Hubbell, Carlon, with metal covers. Receptacle covers shall be double flap, telephone and data covers shall be combination 2"/1/2" inserts. Unless noted otherwise on the drawings, all floor boxes for similar devices shall be either metal or PVC, no intermixing of same types of floor boxes will be allowed.
2. Multi-gang floor boxes shall be fully adjustable, cast iron, watertight use deep type in floors 4-inch or thicker and use shallow type in floors

2 1/2-inch to 4-inch thick. All multi-gang floor boxes shall conform to UL 514A and UL 514C scrub-water testing standards. Provide barriers between line and low voltage compartments of multi-gang floor boxes.

Multi-gang floor boxes: (or equal by Walker/Wiremold)

STEEL CITY	Single	Double	Triple
Deep Floor Box	641	642	643
Shallow Floor Box	841	842	843
Carpet Flange	P64-CP	P64-2G-CP	P64-3G-CP
HUBBELL	Single	Double	Triple
Deep Floor Box	B-2436	B-4233	B-4333
Shallow Floor Box	B-2414	B-4214	B-4314
Carpet Flange	SB-3083	SB-3084	SB-3085

Cover plates shall be polished brass Steel City #P64-DS or Hubbell #S3825 for duplex receptacles, Steel City #P64 or Hubbell #S Series for single receptacles with removable plug sized to match the receptacle to be installed; and Steel City #P64-3/4-2 or Hubbell S-2425 for telephone, TV, microphone, and other systems floor boxes.

- I. Poke Through Outlets: Verify exact location with Architect prior to rough in. Poke through outlets shall be UL Listed for 2 hour fire rating. All poke-through outlets shall conform to UL 514A and UL 514C scrub-water testing standards.
 - 1. Flush Type: Provide with 20A., 120 volt duplex receptacle or 20A. 120 volt duplex isolated ground receptacle as shown on the drawings, per the specification. Walker RC3A20BS Series, or equal by Hubbell. Verify flange and slide color with Architect.
 - 2. Flush furniture feed: Walker RC7006ABR Series, or equal by Hubbell, with liquitite conduit connection to furniture. Verify flange and conduit adaptor assembly color with Architect.

- J. Concealed Service Floor Box: Verify exact location with architect prior to rough-in. All concealed service floor boxes shall conform to UL 514A and UL 514C scrub-water testing standards.
 - 1. Multiple service type with no exposed service fittings. Provide with receptacle, telephone, and data outlets as shown in the Special Outlet Schedule. Verify color with the Architect. Unless otherwise noted in the Special Outlet Schedule, provide Walker RFB4 Series with receptacle, data, and telephone brackets as required and S36CCTC Series recessed activation cover, or equal by Hubbell or Steel City.

- K. Surface Metallic Raceway:
1. Only metallic surface raceways shall be used unless specifically noted otherwise on the Drawings.
 2. Surface metallic raceway and associated outlet boxes shall only be used where shown on the drawings and in remodels and modifications to existing where existing wall and ceiling voids do not permit concealed installation, but shall not be used at any other location unless shown otherwise on the drawings. All outlet box and surface metallic raceway locations must first be approved and coordinated with the Architect. All surface raceway and outlets must be painted to match the surface it is attached to. Use outlet boxes and fittings by the same manufacturer and approved for use with the raceway. Install an equipment grounding conductor sized per NEC Article "Grounding" for the largest circuit in the raceway if not already specified.
 3. Raceways shall be Wiremold #V500 minimum or #V700 for small sizes and Wiremold Series 2000, 3000, and 4000 for larger capacities, unless noted otherwise on the drawings. In all cases, do not exceed the fill per the manufacturers published data. Surface metallic raceways shall be sized to match the conduit sizes indicated on the drawings, or as required by Code. For telephone, data, video, or CATV outlet boxes, use Wiremold V700 series minimum.
 4. Surface metallic raceways shall be provided with all mounting hardware, covers, fittings, outlet boxes, elbows, tees, etc. as required for a complete system.

PART 3 - EXECUTION

3.1 RACEWAY:

- A. An equipment grounding conductor, sized per NEC Article "Grounding", shall be installed in all conduits containing phase conductor(s).
- B. Rigid galvanized steel (GRC) or IMC must be used at all times when exposed to weather or physical abuse and in all NEC classified hazardous locations. EMT may not be used in direct contact with earth, or in concrete slabs on grade.
- C. U.L. approved Schedule 40 P.V.C. conduit may be used where feeders or branch circuits are to be run in earth or slabs (3/4" minimum), except as noted otherwise in 2.1-B-4. Use GRC ells and riser, both horizontal and vertical. All conduit risers through concrete floors shall be GRC from below the top of the floor slab. Use conduit adapters when converting from P.V.C. to steel conduit. Use plastic spacers when more than one conduit is installed together. Spacers shall be installed per NEC Article "Rigid Nonmetallic Conduit". See Drawings for areas requiring concrete encasement. All P.V.C. conduits shall be provided with separate ground conductor sized per N.E.C.

3.2 PENETRATIONS:

A. Cutting or Holes:

1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the Structural Engineer prior to drilling through structural sections.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space.
3. All patching shall be done in a neat and workman-like manner, meeting with the approval of the Architect, by mechanics of the particular trade involved.

B. Fire Stop:

1. Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases, and maintains specified fire rating. Completely fill and seal clearances between raceways and openings with the fire stop material.

C. Fire Barrier Penetration Seals:

1. Manufacturer: Subject to compliance with requirements, provide fire barrier penetration seals of one of the following:
 - 3M fire Barrier Caulk, Putty, or Strip Sheet
 - Carborundum Fiberfrax Fyre Putty
 - Tremco X-ferno Fire Products
 - Rectorseal Metacalk
2. Provide seals for any opening through fire-rated walls, floors or ceilings used as passage for components such as conduits or cables.
3. Cracks, voids or holes up to 4-inch diameter: Use putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat and UL-listed.
4. Openings greater than 4-inch diameter and raceway sleeves through floors at telephone terminal boards: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 degrees to 350 degrees F (121 to 177·C), that is UL-listed. KBS "Sealbags" manufactured by P-W Industries will be acceptable.

5. Execution: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions. All fire barrier seals shall meet the rating of the wall.

D. Waterproofing:

1. At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
2. Any penetrations through roof shall be made with "Stoneman" flashing connections as manufactured by Stoneman Engineering and Manufacturing Co., Inglewood, California, and any penetrations made in exterior or basement foundation walls shall be sealed with Thunderline "Link-seal" connections, as manufactured by Thunderline Corporation, Wayne, Michigan.

3.3 CONDUIT SYSTEMS INSTALLATION, GENERAL:

- A. Installation: In accordance with UL, NEC, as shown, and as hereinafter specified.
- B. Essential (Emergency) raceway systems: Install entirely independent of other raceway systems. Common supports and hangers may be used.
- C. Raceway Burial Depths: (Underground work)
 1. 30 inch minimum cover to grade or bottom of floor slab.
 2. 36 inch minimum cover to grade from top of conduit for secondary services. (Unless otherwise required by Utility Co.) Use minimum 24" radius bends.
 3. 4 inch below concrete slab inside a building.
 4. 48 inch minimum cover to grade from bottom of conduit for primary services. (Unless otherwise required by Utility Co.) Use minimum 36" radius bends.
- D. Install raceways as follows:
 1. In complete runs before pulling in cables or wires.
 2. Flattened, dented, or deformed raceways is not permitted. Remove and replace the damaged raceways with new undamaged material.
 3. Assure raceway installation does not encroach into the ceiling height head room, walkways, or doorways.
 4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
 5. Mechanically and electrically continuous.

6. Independently support raceway. Do not use other supports i.e., (suspended ceilings, suspended ceiling supporting members, lighting fixtures, mechanical piping, or mechanical ducts.). Group raceways with common supports where possible. Conduit shall be supported within 12-inches of connectors.
7. Close ends of empty raceway with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in, or at locations where conduits are stubbed out below grade outside of building.
8. Raceway installations under fume and vent hoods are prohibited.
9. Secure raceways to cabinets, junction boxes, pull boxes and outlet boxes with bonding type locknuts. For GRC and IMC raceway installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make raceway connections to junction box covers.
10. Raceways shall not be used as a support for other raceways or cables.
11. Where conduit sizes are not specifically indicated, provide sizes in accordance with the requirements of the N.E.C.
12. Conduit to be installed to the requirements of structure and to the requirements of all other work on the project. Conduit shall be installed to clear all openings, depressions, pipes, ducts, reinforcing steel, etc. Conduit set in forms for concrete structure shall be installed in such a manner that installation will not affect the strength of the structure. Coordinate installation with Structural Engineer for conduits rising up from floor slabs into bottom of panelboards. Minimum distance between conduits shall be 6". Maximum size of conduit permitted in concrete slabs, if so approved by the Architect, is 1" trade size.
13. Conduit shall be installed continuous between connections to outlets, boxes and cabinets with a minimum possible number of bends and not more than the equivalent of 4-90 degree bends between J-box connections. Bends shall be smooth and even and shall be made without flattening conduit or flaking enamel. Radius of bends shall be as long as possible and never shorter than the corresponding trade elbow. Long radius elbows shall be used where necessary.
14. Conduits shall be securely fastened in place with approved straps, hangers, and steel supports as required by the National Electrical Code. All surface mounted conduits on walls below eight foot above grade shall be secured with conduit straps, no clamps. The use of wire, plumbers straps, etc, will not be permitted.
15. Junction and pull boxes shall be installed where shown on drawings and additional boxes shall be installed if required for pulling of wire, provided location and installation is approved by the Architect. All boxes shall be code gauge construction with screw type covers and shall be installed in accessible locations.

16. Conduit shall be reamed and thoroughly cleaned before installation and kept clean after installation. Openings shall be plugged and boxes shall be covered as required to keep conduit clean during construction. All conduit shall be fished clear of obstructions before the pulling of wires. All conduit shall be as sized above and shall not be smaller than N.E.C. listed minimum requirements.
 17. All work shall be protected against damage during construction and any work damaged or moved out of line after roughing-in shall be repaired and reset to the approval of the Architect without additional cost to the Owner.
 18. Conduit terminations at panelboards, switchboards, motor control equipment, junction boxes, etc., shall be aligned and installed true and plumb. Wood or steel bucks or templates shall be used where required. This work shall also include all steel supports as required for mounting of electrical equipment excepting only where steel supports are specified to be furnished under another specification heading.
 19. Where conduits cross construction expansion joints, Contractor shall provide Appleton XJ or equal expansion couplings with copper bonding jumpers.
 20. Where conduits are installed in concrete, all connectors and couplings shall be water tight or rated for direct burial in concrete.
 21. Mechanical equipment service clearances and electrical apparatus service clearances as specified in their respective manufacturer's product data shall be maintained free from conduit obstructions.
 22. Raceways shall not be routed through mechanical ductwork.
 23. Route all surface metallic raceways for receptacle, telephone, data and all other wall outlet boxes horizontal at base of wall to nearest corner or door trim before rising vertically up wall. Locate all boxes for devices near doors as near as possible to door trim and rise surface metallic raceway up wall adjacent to door trim. Any surface metal raceways routed down walls into existing floors shall be installed tight to existing walls into the existing floor. If this can not be accomplished because of existing conditions, the surface metal raceways shall be routed to or into the ceiling of the room.
- E. Raceway Bends:
1. Make bends with standard raceway bending machines.
 2. Raceway hickey may be used for slight offsets, and for straightening stubbed out raceways.
 3. Bending of raceways with a pipe tee or vise is prohibited.

3.4 CONCEALED WORK INSTALLATION:

A. General:

1. Raceway and Outlet Boxes Installation: All raceway systems work and outlet boxes shall be installed concealed in walls, floor and roof construction or concealed within furred spaces or above ceilings. In equipment or mechanical rooms exposed work shall include feeders and connections to equipment unless noted otherwise.

B. In Concrete:

1. Raceway: GRC, IMC, EMT, or PVC; except do not install EMT in concrete slabs that are in contact with soil, gravel or vapor barriers.
2. Align and run raceways in direct lines (parallel and perpendicular).
3. Install raceways through concrete beams only when the following occurs:
 - a. Where shown on the structural drawings.
 - b. As approved by the Structural Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of raceways in concrete that is less than three inches thick is prohibited. All raceways installed in concrete shall be approved by the Structural Engineer.
 - a. Raceway outside diameter larger than one-third of the slab thickness is prohibited.
 - b. Space between raceways in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
 - c. Install raceways approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the raceways.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to insure low resistance ground continuity through the raceways. Tightening set screws with pliers is prohibited.

C. Above Furred or Suspended Ceilings and in Walls:

1. Raceways for conductors 600 volts and below:
 - a. GRC, IMC, or EMT. Types mixed indiscriminately in the same system is prohibited.

2. Raceways for conductors above 600 volts:
 - a. GRC.
3. Align and run raceways parallel or perpendicular to the building lines.
4. Connect recessed or lay-in lighting fixtures and all other devices installed in a lay-in ceiling to raceway runs with flexible metal conduit extending from a junction box to the fixture. Provide a ground wire in all flexible conduits.
5. Tightening set screws with pliers is prohibited.

3.5 EXPOSED WORK INSTALLATION:

- A. Exposed work only where permitted by the Architect.
- B. Raceways for Conductors 600 volts and below:
 1. GRC, IMC, or EMT types mixed indiscriminately in the system is prohibited.
 2. All raceways exposed to physical abuse and in all industrial pump and treatment plant locations shall be GRC or IMC.
- C. Raceways for conductors above 600 volts:
 1. GRC
- D. Align and run raceways parallel or perpendicular to the building lines.
- E. Install horizontal runs close to the ceiling or beams and secure with raceway straps.
- F. Surface metal raceways: Use only where approved and coordinated with Architect.
- G. Painting:
 1. Paint exposed raceways as specified in Section, PAINTING.

3.6 WET OR DAMP LOCATIONS:

- A. Unless otherwise shown, use raceways of GRC or IMC above grade. Use PVC conduit below grade, except rigid galvanized steel ells and risers shall be used.
- B. Provide sealing fittings, to prevent passage of water vapor, where raceways pass from warm to cold locations, i.e., (refrigerated spaces, constant temperature rooms, air conditioned spaces) or similar spaces.

3.7 MOTORS AND VIBRATING EQUIPMENT:

- A. Use liquid-tight Type UA flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission. Provide liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with flexible metal conduit.

3.8 RACEWAY SUPPORTS, INSTALLATION:

- A. All raceways shall have supports at maximum spacing of 10-feet and within 3-feet of a fitting, elbow, box outlet or enclosure. Safe working load shall not exceed 1/4 of proof test load of fastening devices. This shall apply to both vertical and horizontal conduit runs.
- B. Use pipe straps or individual raceway hangers for supporting individual conduits.
- C. Support multiple raceway runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the raceways, wires, hanger itself, and 200 pounds. Attach each raceway with U-bolts or other approved fasteners.
- D. Support raceways independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items. Do not support raceways from mechanical piping or ductwork.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 1/4-inch bolt size and not less than 1-1/8 inch embedment.
 - b. Power set fasteners not less than 1/4-inch diameter with depth of penetration not less than 3-inches.
 - c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts are permitted. Bolts supported only by plaster are not acceptable.
- G. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- H. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

- I. Chair, wire, or perforated strap shall not be used to support or fasten conduit.
- J. Spring steel type supports "caddy clips" that are listed for the intended use are acceptable in appropriate locations.
- K. Vertical Supports: Vertical raceway runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.10 BOX INSTALLATION:

- A. Boxes for Concealed Raceways:
 - 1. All outlet boxes shall be flush mounted unless noted otherwise on the drawings or herein. Boxes installed in gyp board or plaster finish shall have code gauge galvanized raised covers set to not more than 1/4" behind final finish in non-combustible walls or ceilings, and flush with the wall or ceiling finish in combustible walls or ceilings. Covers shall be selected with proper openings for devices installed in box.
 - 2. Mount flush. Boxes protruding from the finished wall or ceiling surface; recessed with more than 1/4-inch gap between the wall or ceiling surface and the box in non-combustible walls or ceilings; or not flush with the wall or ceiling surface in combustible walls or ceilings will be changed out with all wall or ceiling reconstruction expense paid by the Electrical Contractor.
 - 3. Provide raised covers for boxes to suit the wall or ceiling construction and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes in the same wall mounted back-to-back are prohibited.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4-inches square by 2-1/8 inches deep, with device covers for the wall material and thickness involved.
- F. Where lighting fixtures and appliance outlets are to be mounted in concrete or in plaster finish on concrete, outlet boxes shall be installed in forms at exact dimensions from bench marks, columns, walls or floors.
- G. Where lighting fixtures and appliances outlets are to be mounted on masonry walls and/or plastered furring or other finish, outlet boxes shall be roughed in to general location before installation of wall and furring and shall be reset to exact dimensions before walls and furring are constructed.

- H. All outlet boxes shall be set true to horizontal and vertical lines parallel to walls, floors and ceilings and true to finish lines. All boxes shall be secured to ceilings or walls so all installations are solidly mounted.
- I. Boxes mounted to metal studs shall be mounted with Caddy #MSF metal stud clip, or equal as approved by the Engineer. Boxes mounted to either metal or wood studs shall be mounted with Caddy #7666 farside box support, or equal as approved by the Engineer. Single metal stud box clips without box supports are not acceptable for mounting boxes.
- J. Boxes for exterior or wet location exposed work (where approved by the engineer) shall be Appleton or Pyle National Type FS or FSC for shallow devices and Type FD or FDC for deep devices. Boxes for ceiling mounted light fixtures shall have approved no-bolt fixture studs. Boxes used as junction boxes shall have beveled edge flat steel blank cover.
- K. Where outlet boxes are mounted exposed in unfinished areas, (where approved by the engineer) surface mounted boxes shall be 4-inches square, have rounded corners and 1/2-inch raised steel cover plates.
- L. Location of outlets on small drawings is approximate and exact dimensions for locations of outlets shall be as taken from large scale plans and details on drawings or as directed by the Architect/Engineer. Outlets shall be located generally from column centers and finished wall lines or to center of wall or joints between wall panels. Ceiling outlets shall be installed at elevation of suspended ceiling connected to outlets in ceiling or slab above. Where necessary to fit and center with panel or ceilings and wall spaces, the contractor must, at no expense the Owner, shift the lighting outlets or other outlets as required by the Architect.
- M. Clock outlets shall be mounted 7-inches below ceiling height unless otherwise noted on the drawings. All other outlets shall be mounted at heights above floor as called for on drawings or as directed.
- N. Bracket lights over mirrors shall be centered on mirrors with 2-inch fixture clearance above mirror.
- O. Boxes for switches and receptacles installed in columns shall be located off center to allow for future partitions.
- P. Boxes for switches at or near door shall be installed on the side opposite the hinge. Verify door swing direction prior to rough-in.
- Q. To prevent sound from traveling through walls, electrical devices from different rooms shall not be mounted in the same stud place. Through-wall boxes shall not be used. In fire rated walls or partitions, outlet boxes on opposite sides of walls or partitions shall be separated by a horizontal distance of 24-inches. Outlet boxes larger than 4-inch square shall not be installed in fire rated walls or partitions, unless contractor provides fire barrier pads around outlet boxes to maintain fire rating of walls or partitions. Verify location of fire rated walls or partitions with Architectural drawings prior to rough-in.

- R. Mark all junction boxes and pull boxes with panel, circuit number, and voltage.
- S. All floor boxes shall be cleaned of all construction debris and dirt.
- T. Where fire rated 'poke-through' devices are specified, Contractor shall install devices after concrete pour and after final verification of location with Owner. Fire rated 'poke-through' devices shall be spaced apart from each other as required by the manufacturer and U.L.
- U. Sectional boxes shall not be used except where directed and approved by the Architect for installation in non-plastered tile walls and provided conduit connections are installed concealed in walls.
- V. Install all outlets in a secure and substantial manner and locate so as to be compatible with space, construction and equipment requirements and with the work of the other trades.
- W. Furnish and install plaster rings for all boxes installed in plastered (or gyp board) ceilings and walls. Verify construction with general construction drawings.
- X. Boxes for switches at or near doors shall be installed on the side opposite the hinge and within 6" of the door. Verify door swing direction prior to rough-in.
- Y. Rough-in outlets for electric water coolers so as to be concealed behind coolers, but remain accessible, in accordance with recommendation of equipment supplier.
- Z. Provide blank cover plates for all outlet boxes not used. Plates in finished areas shall match those specified for switch and receptacle devices. Blank cover plates for junction boxes supplied from the emergency system or fire alarm system shall be painted red.

END OF SECTION 26 05 30

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section includes the furnishing, installation and connection of panelboards.

PART 2 - PRODUCTS

2.1 PANELBOARDS:

- A. Panelboards shall be in accordance with UL, NEMA, NEC, and as shown on the drawings. Panelboards shall be by the same manufacturer as the remainder of the distribution equipment on the project. No mixing of manufacturers on the project. Approved manufacturers shall be as follows:

Panelboard Type	Square 'D'	Siemens ITE	General Electric	Cutler- Hammer
Branch Circuit Panelboard 240V	NOOD	P1	AL/AQ	PRL1
Branch Circuit Panelboard 480V	NF	P1	AE	PRL2
Circuit Breaker Distribution Panelboard	I-Line	S4&S5	Spectra	PRL3, PRL4
Fusible Distribution Panelboard	QMB	F1&F2	QMR	PRL4F

- B. Branch circuit and distribution panelboards rated up to 240V (400A. max) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 10,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings. All breakers shall be of either the plug-in type or bolt-on type.
- C. Branch circuit and distribution panelboards rated over 240V and up to 480V (400A max) shall have a short circuit current rating tested to U.L. Standards for a minimum rating of 14,000 A.I.C. unless noted otherwise. Breaker rating with-in panel shall be equal to or greater than minimum integrated equipment rating. Series ratings will not be accepted, unless specifically noted otherwise on the drawings. All breakers shall be of the bolt-on type only.
- D. Distribution panelboards located in finished rooms (other than mechanical, electrical or janitor rooms) shall be provided with key locking doors.

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- E. Provide standard manufactured products. All components of panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.
- F. All panels shall be dead front safety type. Arrange sections for easy removal without disturbing other sections. All distribution panels in finished areas shall be provided with key locking doors. All panels in finished areas shall be recessed with flush type covers.
- G. All panelboards shall be completely factory assembled with molded case circuit breakers or switches.
- H. Panels shall have main breaker/switch or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as scheduled on the drawings.
- I. Panelboards shall have the following features:
 - 1. Non-reduced size tin plated copper bus bars (phase and neutral), and copper connection straps bolted together and rigidly supported on molded insulators. Bus bar tops for panels with single pole branches shall be arranged for sequence phasing of branch circuit devices. All lugs shall be AL/CU rated.
 - 2. Full size neutral bar shall be mounted on insulated supports. Provide 200% neutral bar for panels fed from K-rated transformer or as shown on drawings. Minimum number of lugs shall be equal to 90% of number of pole spaces in the panelboard, except in computer rated panelboards or isolated ground panelboards provide 100% of pole space lugs. Each neutral conductor shall be terminated under a separate lug.
 - 3. Copper ground bar with sufficient terminals for all grounding wires. Minimum number of lugs shall be equal to 90% of number of pole spaces in the panelboard, except in computer rated panelboards or isolated ground panelboards provide 100% of pole space lugs. Each ground conductor shall be terminated under a separate lug.
 - 4. Distribution panels located in finished rooms (other than mechanical, electrical rooms or janitor rooms) shall be provided with key locking doors.
 - 5. All breakers and phase bus connections shall be arranged so that it will be possible to substitute a 2-pole breaker for two single pole breakers, and a 3-pole breaker for three single pole breakers, when trip is 100 amps or less without having to drill and tap the main bus bars at bus straps.
 - 6. Design interior so that protective devices can be replaced without removing adjacent units, main bus connectors, and without drilling or tapping. Panel phase bus connections to protective devices shall not be riveted to the panel bus and shall be field removable by means of a screw driver.

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7. Where designated on panel schedule as "space", include all necessary bussing, device support, and connections. Provide blank cover for each space.
8. In two section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side or feed through lugs on the load side with cable connections to the second section. Panelboard sections with tapped bus or crossover bus shall not be accepted.
9. Electrical Contractor shall coordinate lug quantities with the number of feeder conductors serving panelboard.
10. All panelboards serving devices having isolated ground circuits shall be provided with an additional insulated copper ground bus for connection of isolated ground conductors.

2.2 CABINETS AND TRIMS:

A. Cabinets:

1. Provide galvanized steel cabinets to house panelboards. Cabinets for distribution panels may be factory primed and suitable treated with a corrosion-resisting paint finish meeting UL standard for outdoor applications.
2. Cabinet enclosure shall not have ventilating openings (225A. and less).
3. Back and sides shall be of one piece formed steel. Cabinets for distribution panels may be of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide minimum of four interior mounted studs and necessary hardware for "in" and "out" adjustment of panel interior.
5. Flush mounted cabinets for two section panelboards shall have both sections bolted together, arranged side by side, shall be the same height and should be 1-1/2 inches apart and coupled by conduit nipple.
6. Gutter size in panel boxes, on all sides, shall be in accordance with the NEC. Cabinets containing through feeders shall have the gutters space increased by the amount required for auxiliary gutters in the NEC.

B. Trims and doors:

1. Panels shall have hinged covers with concealed trim clamps, doors shall have laser cut trims with concealed hinges, and flush lock, master keyed. Hinged cover shall have continuous piano hinge down one side with door opening by a single latch.
2. Flush trims shall overlap the box by at least 3/4-inch all around.

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3. Surface trim shall have the same width and height as the box. Trim overlap or protruding past the box sides will not be allowed.
 4. Flush or surface trims shall not have ventilating openings (225A. and less).
 5. Secure trims to back boxes with indicating trim clamps.
 6. Provide a welded angle on rear of trim to support and align trim to cabinet.
 7. Provide separate trims for each section of multiple section panelboards. Doors of all sections shall be of the same height.
 8. All branch circuit panelboards, and distribution panelboards with doors, shall be provided with key locking doors. Furnish two (2) keys for each lock to Owner.
 9. Consult the drawings for flush or surface mounted panels.
- C. Doors:
1. Provide concealed, butt hinges welded to the doors and trim.
 2. For magnetic contactors incorporated in panelboards, provide separate interlocked doors for the contactors.
 3. Provide keyed alike system for all panelboards.
 4. Provide a typed directory card and metal holder, with transparent cover. Permanently mount holders on inside of doors.
- D. Painting:
1. Thoroughly clean and paint trims and doors at the factory with primer and manufacturer's standard finish.

2.3 MOLDED CASE CIRCUIT BREAKERS FOR PANELBOARDS:

- A. Breakers shall be UL listed and labeled, in accordance with the NEC, as shown on the drawings, and as specified.
- B. Circuit breakers in panelboards shall be securely attached to the phase bus bar or branch circuit bar using the manufacturers standard method of attachment.
 1. Molded case circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for 100 ampere frame or less. Magnetic trip shall be adjustable for breakers with 400 ampere frames and higher. Factory setting shall be used, unless otherwise noted.

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2. Molded case circuit breakers for lighting circuits shall be switching duty rated and suitable for use on HID lighting circuits.
 3. Ground fault circuit interrupter breakers (GFCI) for breakers less than 60 Amp shall be personnel protection (Class A) rated at 5 ma trip unless otherwise specified as equipment protection.
- C. Breaker features shall be as follows:
1. A rugged, integral housing of molded insulating material.
 2. Silver alloy contacts.
 3. Arc quenchers and phase barriers for each pole.
 4. Quick-make, quick-break, operating mechanisms.
 5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
 6. Electrically and mechanically trip free.
 7. An operating handle which indicates ON, TRIPPED, and OFF positions.
 8. Line connections shall be bolt-on.
 9. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
- D. Where new circuit breakers are noted on the drawings to be installed in existing panelboards, verify and coordinate the circuit breaker type and manufacturer with the existing panelboard.
- 2.4 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS:
- A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with applicable requirements of those specified for panelboards.
 - B. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA type most suitable for the environmental conditions where the breakers are being installed.
- 2.5 METERING SYSTEM:
- A. Provide metering system for all panelboards where indicated on drawings.
 - B. The incoming main sections of the panelboards shall be provided with an Electronic Power Monitoring system. The system shall be factory installed and shall include all required CTs, PTs, CPTs and communication wiring necessary for a completely functional power monitoring system. The system shall be equal to Square D PM-870 Power Meter having the following features:

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1. Current: Per phase and neutral.
2. Current demand - Max., per phase & neutral.
3. Voltage, per phase (L-L, L-N).
4. Real power, 3 phase total (kW).
5. Reactive power, 3 phase total (kVAR & kVA).
6. Power factor, 3 phase total.
7. Real power demand.
8. Real energy (kWh).
9. Reactive power demand, present & peak.
10. Apparent power demand, present & Peak.
11. Real energy, IN & OUT (kWh).
12. Reactive energy, IN & OUT (kVARh).
13. Min./max. readings I, V, F, PF, THD, TOTAL kW & kVAR.
14. THD, voltage & current per phase.
15. Alarm event log.
16. Setpoint-driven alarms.
17. Demand methods: Block interval (sliding, fixed, rolling) & Synchronized demand (input, command, clock).
18. Communications & I/O.: RS-485 & KYZ/KY output.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with NEC, as shown on the drawings, and as specified.
- B. Where flush mounted panels occur on drawings contractor shall stub into nearest accessible ceiling void for future use, (1) 1 inch empty conduit for every four spare 20A. breakers or four unused panel spaces. For panels located on multi-floor buildings, conduits shall be stubbed into accessible ceilings both above and below panel. Conduits stubbed into ceiling void below panel shall be provided with conduit cap and labeled "To Panel Above".
- C. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes of cabinets with designated closet space.
- D. After wiring, label each circuit and install a typewritten schedule of circuits in each panelboard after approval by the Engineer. Schedule shall be typed on the paper directory cards. Include the room numbers and items served on the cards. Schedule shall indicate as-built conditions if circuiting is installed different than shown on the drawings. Schedule shall indicate final room numbering approved by Owner. Mark spare circuit breakers, and provisions for future circuit breakers, in pencil on schedule for future circuit marking.
- E. Mount the panelboard so that maximum height of circuit breaker or switch above finished floor shall not exceed 78 inches. For panelboards which are too high, mount panelboard so that the bottom of the cabinets will not be less than six inches above the finished floor.

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- F. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.
- G. Other than minor deviations approved by the Engineer, provide circuit breaker arrangement in panelboards to match circuit numbering on the drawings.
- H. All electrical distribution equipment (switchboards, panelboards, disconnect switches, transformers, starters, etc.) shall be of one manufacturer, unless specifically noted on the drawings, in the specifications, or approved by the Engineer. Intermixing of distribution equipment by different manufacturers will not be permitted.
- I. If layout changes are required due to other electrical manufacturers equipment size, they must be submitted to and approved by the Engineer prior to bidding. National Electric Code working clearances must be maintained at all times. In no case will extra remuneration be allowed for layout changes that differ from those shown.
- J. All items of distribution equipment required to be floor mounted shall be mounted on a minimum 3 1/2" concrete base above floor. Concrete base to be by Electrical Contractor.
- K. Panel schedules are not shown on the drawings, however, copies of these schedules are available to the successful Contractor after bids are let, upon request to the Engineer.
- L. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA types most suitable for the environmental conditions where the equipment is to be installed.
- M. All panelboards supplied from an emergency source shall have breakers provided with handle lock-off for each breaker. Breaker handles to be set in the "ON" position.
- N. Turn all spare circuit breakers in panelboards to off position.
- O. In addition to panel nameplate, provide a nameplate on the face of each branch circuit or distribution panel lettered: "WARNING, POTENTIAL ARC-FLASH HAZARDS EXIST WHILE WORKING ON THIS ENERGIZED EQUIPMENT". All distribution panels shall also have a nameplate for each circuit breaker or fusible switch indicating load served if the distribution panel is not furnished with a circuit directory.
- P. No piping, ductwork, or equipment foreign to the electrical installation shall be located in the electrical distribution equipment dedicated space as defined in N.E.C. Article 110.26 (F) (1). The Mechanical Contractor and Fire Sprinkler System Contractor shall locate ductwork and piping to clear the electrical distribution equipment dedicated space.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section includes the furnishing, installation, and connection of wiring devices.

PART 2 - PRODUCTS

2.1 RECEPTACLES: (Designer Style) Tamper - Resistant

A. LIST OF ACCEPTABLE RECEPTACLE MANUFACTURERS:

Manufacturer:	Hubbell	Leviton	P&S	Cooper
Receptacles (Tamper Resistant):				
Non-Hospital Grade:	DR20GRYTR	EQUAL	EQUAL	EQUAL
Duplex: 20A. 125V.	GFR	APPROVED	APPROVED	APPROVED
Ground Fault: 20A. 125V.	5362SGGYTR	BY	BY	BY
		ENGINEER	ENGINEER	ENGINEER
	GFR8300SGY			
Hospital Grade: 20A. 125V.				

- B. Other manufacturers will be considered by the Engineer provided that specific device information is received by the Engineer prior to bid. No substitutions will be considered after bid letting.
- C. Where receptacles are indicated on the drawings as "WP" (weatherproof) or required by applicable codes to be weatherproof, they shall be G.F.C.I. duplex heavy duty weather resistant grounded receptacles.
 - 1. Provide WP receptacles with a single lift hinged weatherproof coverplate for interior or exterior receptacles protected from the weather (not subjected to rain, water runoff, or hose down) or in other damp locations.
 - 2. Where interior or exterior WP receptacles are installed in wet locations (subjected to rain, water runoff, or hose down), provide non-metallic weatherproof cover, "Suitable for wet locations while in use", and UL Listed.
 - a. Taymac #MM400C-B
 - b. Carlon E9UVC (vertical) or #E9UHC (Horizontal)
 - c. Intermatic #WP1000C (vertical) or WP1000HC (horizontal)
 - d. Cooper #4966 (vertical)
- D. See plans for special outlet schedule.

- E. Receptacle body shall be formed of high-impact thermoplastic or urea and receptacle contacts shall be Bronze. Receptacles shall be listed by U.L. and conform to NEMA standards as well as the latest Federal Specification W-C-596. Certification that receptacle meets or exceeds N.E.M.A. Standards shall be submitted to the Engineer for approval.
- F. All receptacles shall be self grounding with ground lug.
- G. Install receptacles to clear all cabinets, equipment, etc.
- H. Color of receptacles on normal power shall be AS SELECTED BY THE architect. (Unless noted otherwise). Receptacles on emergency power shall be Red in color. Verify normal power colors prior to ordering.
- I. All 120V, 20A receptacles in exterior locations, elevator machine rooms, elevator pits, toilets and restrooms, per NEC, and as located on the plans shall be tamper resistant ground fault circuit interrupters (GFCI) for personnel protection (Class A) with 5ma trip.
- J. Provide double duplex receptacle on separate circuit beside each telephone terminal board location and other communications equipment requiring 120V, power.
- K. Where weather proof receptacles are indicated on the drawings to be provided, receptacles shall be extra heavy duty weather resistant GFI equal to Hubbell #HBL5362GYTR, 20 amp, 125 volt, color as selected by Architect.
- L. Once device manufacturer has been selected, all devices and plates in the project shall be of one manufacturer, unless noted otherwise on the drawings or in the specifications.

2.2 TOGGLE SWITCHES: (Designer Style)

- A. Wall Switches: Wall switches in general, used to control lighting, shall be quiet operating, listed by U.L. and conform to NEMA standards as well as the latest Federal Specification W-S-896e.
- B. Switches shall be single pole, two-pole, three-way, four-way, keyed, and with pilot light as called for on the drawings. Groups of switches shall be under one gangplate. Where switches are in fire rated walls groups of switches shall be maximum of two (2) gangs under one cover plate.
- C. Switches shall be as follows unless specified otherwise.

Single Pole	20 A. 125 V. 277 V.
Two Pole	20 A. 125 V. 277 V.
Three-Way	20 A. 125 V. 277 V.
Four-Way	20 A. 125 V. 277 V.
Pilot Light	20 A. 125 V. 277 V.
Key Switch	20 A. 125 V. 277 V.

- D. All switches shall be self grounding w/ground lugs.
- E. List of acceptable switch manufacturers:

Manufacturer:	P&S	Hubbell	Leviton	Cooper
Toggle Switches	EQUAL APPROVED BY ENGINEER	EQUAL APPROVED BY ENGINEER	EQUAL APPROVED BY ENGINEER	EQUAL APPROVED BY ENGINEER

- F. Other manufacturers will be considered by the Engineer provided that specific device information is received by the Engineer prior to bid. No substitutions will be considered after bid letting.
- G. Pilot light switches shall be illuminated toggle switch lighted red in "on" position. Key switches shall be master keyed.
- H. Switches on emergency power shall be Red in color.. Verify normal power colors prior to ordering.
- I. Provide barriers between 277V. switches, between 277V. and 120V. switches, and between combination 277 volt switches/120 volt receptacles installed in a common outlet box.
- J. LED wall box dimmers shall be linear slide type with smooth face plates, no exposed cooling fins, for loads to 2000W. For multigang dimmer installations, derate dimmer wattage per manufacturers requirements, or install dimmers in separate outlet boxes. Verify color of face plate and dimmer with Architect prior to ordering. Dimmer switches for fluorescent light fixtures shall be slide type, equal to Lutron. Fluorescent dimmer switches shall be compatible with the ballast used with the light fixture. Coordinate with ballast manufacturer. Dimmers shall be provided with required filtering and of the types (solid state, low voltage) as required for the lamps connected. Lamp hum will not be tolerated.
- K. Once device manufacturer has been selected, all devices and plates in the project shall be by the same manufacturer, unless noted otherwise on the Drawings or in the Specifications.

2.3 WALL PLATES:

- A. All wall plates shall be Stainless Steel, smooth surface wall plates. Where plates are noted to be engraved or labeled, provide stainless steel wall plates and provide engraved filled letters. Stainless steel plates where specified shall be .032" nominal thickness, non-magnetic.
- B. Wall plates shall be Red for devices on emergency power.

- C. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- D. Provide blank plates for all telephone, cable TV, communication outlets not used by telephone, cable TV, or communications installers.
- E. All emergency receptacle and switch cover plates shall indicate panel name and circuit number from which the device is served.
- F. Plates shall be set plumb and parallel with the wall. There shall be no gap between the plate and the wall surface.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with the NEC, and as shown on the drawings.
- B. Switches shall be located on the latch side of all doors. If switches must be located on the hinge side of a door, they shall be located so that they are not behind the door when it is open. All questionable locations shall be brought to the Engineers/Architects attention prior to rough-in.
- C. Verify all outlet locations on the job prior to rough-in. Locations may be altered up to 6'-0" in any direction as directed by the Architect or Engineer without additional cost to the Owner.

END OF SECTION 26 27 26

SECTION 26 51 00 - BUILDING LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section includes the furnishings, installation of and connection of all building lighting.
- B. Fixtures shall be completely free of defects, dents, rust or chipped surfaces. No cracked, broken, or chipped lenses will be acceptable. Fixtures that are cracked, broken, chipped, rusted, dented or otherwise damaged, shall be replaced without additional cost to the Owner. Fixtures shall be furnished complete including hickeys, suspension nipples, and all other materials and equipment as required for hanging and supporting fixtures. All recessed mounted fixtures shall be mounted with the trim flush to the finish ceiling or wall surfaces, free of gaps or cracks.
- C. Electrical Contractor shall verify exact ceiling types in all areas with architectural room finish schedule for exact fixture mounting (i.e., grid or flange type mounting) prior to ordering of fixtures. Electrical Contractor shall verify ceiling construction details in all areas and provide appropriate mounting hardware for installation of lighting fixtures.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES:

- A. Shall conform to the detail drawings, NEC Article "Luminaires (Lighting Fixtures), Lampholders, And Lamps", and UL-57.
- B. Sheet Metal:
 - 1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved), and parallel to each other as designed.
 - 2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 - 3. Where lighting fixture types are detailed with minimum 20 gauge (0.035 inch) housing, minimum 22 gauge (0.029 inch) housings will be acceptable provided they have strengthening embossed rib and break formations, and meet the rigidity test requirements of Fed. Spec. W-F-1662.
 - 4. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.

5. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.
- C. Ballasts or Drivers shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified. Ceiling tile located next to fixtures shall not have to be removed to service fixture.
- D. Lamp Sockets: Florescent, if specified
 1. Lampholder contacts shall be as standard by the manufacturer and shall conform to the applicable requirements of UL 542 and ANSI C-81. Lampholders for bi-pin lamps, with the exception of those for "U" type lamps, shall be of the telescoping compression type, or of the single slot entry type requiring a one quarter turn of the lamp after insertion.
- E. Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.
- F. All lighting fixtures with louvers or light transmitting panels shall have doors with hinges, captive spring loaded latches, and safety catches to facilitate safe, convenient cleaning and relamping. Vaportight fixtures shall have pressure clamping devices in lieu of the latches.
- G. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- H. Metal Finishes:
 1. The manufacturer shall apply a standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
 2. All linear fixtures shall be provided with factory applied powder coat baked enamel finish, applied after final fabrication, for all parts (housing, door, end plates, ballast or drivers covers, socket channels, etc) unless specifically noted otherwise on the lighting fixture schedule or drawings. Fixtures using pre-painted metal components will not be acceptable.
 3. Interior light reflecting finishes shall be white with not less than 92 percent reflectances, except where otherwise shown on the drawing.
 4. Exterior finishes shall be as shown on the drawings.
- I. Fluorescent Lamp Ballasts: (If specified on drawings)
 1. Ballasts shall be provided in one or two lamp configurations. Three or four lamp electronic ballasts will not be allowed unless noted otherwise

on the drawings, or as provided in “Master-Satellite” wiring arrangements.

2. When different lamps in the same fixture are controlled by separate switches (2 or 3 level lighting), the switches shall control the same lamp positions in all fixtures controlled by those switches. Arrangement of switching will generally be that the first switch controls the outside lamps, and the second switch controls the middle lamp or lamps unless noted otherwise on the drawings.
3. All ballasts shall be labeled or listed by UL or ETL. Case marking shall also indicate the required supply voltage, frequency, RMS current, current surge during starting, input watts, and power factor at the designed voltage, open circuit voltage, crest factor and efficacy.
4. Submit, simultaneously with shop drawings, a certified test report by an independent testing laboratory showing that the ballasts meet or exceed all the performance requirements in this specification.
5. Ballasts shall be provided in voltages to match connected circuits. Verify circuit voltage prior to ordering light fixtures.
6. High-Frequency Energy Savings electronic ballasts for T8 lamps:
 - a. General Requirements: Unless otherwise indicated, features include the following:
 - (1) Designed for type and quantity of lamps indicated at full light output.
 - (2) Operating Frequency: 20 kHz or higher.
 - (3) Voltage Range: +/- 10 percent of rated input.
 - (4) Total Harmonic Distortion Rating: Less than 20 percent.
 - (5) Power Factor: Greater than 97 percent.
 - (6) Lamp Current Crest Factor: 1.7 or less.
 - (7) Sound Rating: Class A or better.
 - (8) Starting Temperature: 50 degree Fahrenheit minimum for fixtures installed in conditioned spaces, 0 degree Fahrenheit minimum for fixtures installed exterior of building or in non-heated areas of the building.
 - (9) Transient Protection: Comply with IEEE C62.41, Location A2.
 - (10) Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
 - (11) Ballasts shall be secured by a minimum of two bolts.
7. High-Frequency Energy Savings electronic ballasts for T5 and T5HO lamps:
 - a. General Requirements: Unless otherwise indicated, features include the following:

- (1) Designed for type and quantity of lamps indicated at full light output.
 - (2) Operating Frequency: 20 kHz or higher.
 - (3) Voltage Range: +/- 10 percent of rated input.
 - (4) Total Harmonic Distortion Rating: Less than 10 percent.
 - (5) Power Factor: Greater than 98 percent.
 - (6) Lamp Current Crest Factor: 1.7 or less.
 - (7) Sound Rating: Class A or better.
 - (8) Starting Temperature: 50 degree Fahrenheit minimum for fixtures installed in conditioned spaces, 0 degree Fahrenheit minimum for fixtures installed exterior of building or in non-heated areas of the building.
 - (9) Transient Protection: Comply with IEEE C62.41, Location A2.
 - (10) Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
 - (11) Ballasts shall be secured by a minimum of two bolts.
 - (12) Ballasts shall incorporate lamp shutdown circuiting for end-of-lamp-life lamp protection.
8. Electronic ballasts for Linear lamps: Unless otherwise indicated, features include the following, in addition to those in "General Requirements" Paragraph above:
- a. Certified Ballast Manufacturer Certification: Indicated by label.
 - b. Encapsulation: Without voids in potting compound.
 - c. Parallel Lamp circuits: Multiple lamp ballasts connected to maintain full light output on servicing lamps if one or more lamps fail.
9. Ballasts for Dimmer-Controlled Fixtures: Comply with general and fixture-related requirements above for electronic ballasts.
- a. Compatibility: Certified by manufacturer for use with specific dimming system indicated.
 - b. Ballasts shall be high frequency electronic type, dimmable 100%-5%.
 - c. Positive starting at all dimming levels.
 - d. No lamp dropout.
 - e. No flicker at all dimming levels.
10. Ballasts shall be as manufactured by Sylvania, Motorola, Magnatek, Universal, Jefferson, Howard, or Advance.
- K. Provide all lighting fixtures with a specific means for grounding their metallic wireways and housings to an equipment grounding conductor.
- L. Lighting Transmitting Components for Fluorescent Fixtures:
1. Shall be 100 percent virgin acrylic plastic and nominal .125 inch thick (minimum thickness shall be no less than 0.115" thick). Styrene lenses shall not be provided for any fixture.

2. Unless otherwise specified lenses and diffusers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking. At final inspection, all lens that sag or do not lay down flat shall be replaced by the manufacturer.

2.2 LAMPS: (If specified on drawings)

- A. Lamps shall be as follows. Once a manufacturer has been selected, all lamps on the project shall be by the same manufacturer.
 1. Linear Fluorescent Lamps:
 - a. Except as indicated on the drawings, lamps shall be T8, T5, or T5HO as specified on the drawings. Lamps shall have a correlated color temperature as specified on the drawings, or as specified by the Architect. Verify all lamp correlated color temperatures prior to ordering lamps.
 - b. Fluorescent lamps, unless noted otherwise on the drawings, shall be Sylvania Energy Savings series for T8 lamps, Sylvania Pentron High Performance "800" series for T5 lamps, or Sylvania Pentron High Output High Performance for T5HO lamps, or equal by Phillips, G.E. or as approved by the Engineer. Verify all lamp correlated color temperatures with Architect prior to ordering.
 2. LED
 - a. Shall be Reduction of Hazardous Substance (RoHS) compliant, and comply with FCC 47 CFR Part 15, IES LM-79 & 80.
 - b. Minimum CRI of 80 with a color temperature of 3000-3500°K for interior fixtures and 4000-4500°K for exterior fixtures, unless otherwise noted in the Contract Documents.
 - c. Minimum rated life of 60,000 hours at 25°C ambient temperature.
 - d. LED driver shall have a THO of <20% and a power factor of 0.95 or higher with integral short circuit, open circuit and overload protection.
 - e. LED driver and LED module shall be accessible and replaceable from below.
 - f. LED lighting fixtures shall be assembled in the USA with minimum 80% materials content from the USA.
 - g. LED fixtures shall be provided with a minimum 10 year warranty on entire fixture (all components).

2.3 EMERGENCY LIGHTING AND POWER:

- A. When emergency battery power packs are optional to the specified exit signs and emergency fixtures and are not included in the model number in the light fixture schedule, the emergency battery power packs shall be included as part of the specified fixture when they are not connected to an emergency generator system. Verify on drawings.

- B. Emergency operation of fixtures:
1. Fixtures shown in the fixture schedule to contain a battery charger and battery shall be supplied with a factory installed sealed replaceable nickel cadmium battery and a solid state inverter charger and switch systems.
 2. The emergency Battery Section shall be connected on the same circuit as the light ahead of any switches or contactors controlling area lights so that emergency lighting is maintained at all times. Other lamps not on emergency system in same fixture will be switched with area lights. Lamp sockets in Emergency Fixtures shall be in the exact same position as lamp sockets in non-emergency fixtures of the same type and number of lamps. All components shall be contained within the fixture. The emergency battery system shall operate two lamp (1000 lumen minimum) for a minimum of 90 minutes. Battery charger shall be capable of recharging batteries to full charge within 24 hours after complete discharge. Fixture shall contain pilot light to indicate charger condition and a test switch to simulate power failure. Systems shall be unconditionally guaranteed for three (3) years by emergency unit. Units shall be manufactured by Bodine, Iota, or approved by Engineer.
- C. Exit Signs And Other Emergency Fixtures:
1. Provide emergency battery power packs on all exit signs and emergency fixtures that are not connected to an emergency generator.
 2. Batteries shall be lead calcium, pure lead, or nickel cadmium as indicated on the drawings. Lead acid will not be accepted. Batteries shall be unconditionally guaranteed for 5 years with a 10 year prorated warranty from the factory. Units shall be Underwriter's Laboratory listed and labeled as an emergency unit. Batteries shall be provided as standard or as optional equipment of the same series of the specified fixtures.
 3. The emergency Battery Section shall be connected on the same circuit as the area lighting, ahead of any switches or contactors controlling area lights so that emergency lighting is maintained at all times.

2.4 LIGHTING CONTROL EQUIPMENT:

- A. See the drawings for the arrangement and method of control. Controls shall operate at 120 volt. Connect to the nearest 120 volt panel or as shown on the drawings.
- B. Contactors And Relays:
1. Shall be as manufactured by Cutler-Hammer, Allen Bradley, G.E., Siemens/ITE, or Square 'D'. They shall be as sized on the drawings.
 2. All contactors and relays shall be Tungsten rated.

C. Time Switches:

1. Time switches by Tork, Intermatic, and Paragon equal to those listed on the drawings or indicated below and approved by the engineer will be acceptable.
2. Exterior lighting or interior time switches shall be Intermatic ET70115C Series 7 day 20A., SPDT with carry-over.
3. All time switches shall be provided with momentary contacts if required.
4. All time switches shall be provided with manual bypass switches and standby battery systems.
5. Set time switches per Owners requirements.

D. Photo Electric Controls:

1. Photo Electric Controls by Tork, Intermatic and Paragon equal to those indicated below and approved by the Engineer will be acceptable.
2. Photo Electric Controls (Photo switches; Photo cells) shall be Intermatic #K4133 rated at 3000W, 277 volts, or #K4121 rated at 1800W, 120 volts, weatherproof. Mount on roof and orient photo electric controls to the north. Photo-electric controls supplied as a part of a fixture assembly shall be as provided by fixture manufacturer.
3. Photo Electric Controls installed on light fixtures shall be supplied in finish to match the light fixture.

- E. When a photo cell and time clock are specified for combination control, they shall be connected in series. The time clock to be on during the day, the photo cell will turn the lights on during the day if a storm passes over and at dusk. Set the time clock to turn the lights off in the evening and back on before sunrise per the owners requirements. At sunrise, the photo cell will turn the light off.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with the NEC, and as shown on the drawings.
- B. Align, mount and level the lighting fixtures uniformly.
- C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for

equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Engineer.

- D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings. Verify all heights with the Architect prior to mounting.
- E. Lighting Fixture Supports:
1. Shall provide support for all of the fixtures in accordance with U.L., U.B.C., and N.E.C. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
 2. Shall maintain the fixture positions after cleaning and relamping.
 3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
 4. Hardware for recessed fixtures:
 - a. Where the suspended ceiling system is supported at the four corners of the fixture opening, hardware devices shall clamp the fixture to the ceiling system structural members, or plaster frame at not less than four points in such a manner as to resist spreading of the support members and safely lock the fixture into the ceiling system.
 - b. Where the suspended ceiling system is not supported at the four corners of the fixture opening, hardware devices shall be furnished by E.C. to independently support the fixture from the building structure at four points.
 - c. In all cases, four NEC approved clips shall be installed to firmly attach the fixture to the ceiling.
 5. Hardware for surface mounting fixtures to suspended ceilings:
 - a. In addition to being secured to any required outlet box, fixtures shall be bolted to a grid ceiling system at four points spaced near the corners of each fixture. The bolts shall be not less than 1/4-inch secured to channel members attached to and spanning the tops of the ceiling structural grid members. Non-turning studs may be attached to the ceiling structural grid members or spanning channels by special clips designed for the purpose, provided they lock into place and require simple tools for removal.
 - b. In addition to being secured to any required outlet box, fixtures shall be bolted to a plaster ceiling at four points spaced near the corners of each fixture. Pre-positioned 1/4-inch studs or threaded plaster inserts secured to ceiling structural members

shall be used to bolt the fixtures to the ceiling. In lieu of the above, 1/4-inch toggle bolts may be used on new or existing ceiling provided the plaster and lath can safely support the fixtures without sagging or cracking.

6. Provide safety supports from ballast or fixture housing up to structure above for all fixtures weighing more than 15 lb. Supports shall be chains, aircraft cable, factory or field fabricated and rated in excess of twice the weight of the fixture.
- F. If fluorescent: Provide and install new lamps for each new lighting fixture installed and for each existing lighting fixture reinstalled.
- G. Contractor shall coordinate between the electrical and ceiling trades to ascertain approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed. Lay-in type fixture installed in sheet rock ceilings shall be provided with a flange and bolted to the ceiling.
- H. Connections to all fixtures mounted in lay-in ceilings shall be as follows:
1. Provide J-Box on structure above fixtures for power circuit supply connections. Install U.L. listed 3/8" flexible (min.) steel conduit (whip) down to each fixture. Each whip shall be field cut to length to allow fixture to be relocated up to 4'-0" in any horizontal direction. Whips shall include (2) or (3) #12 AWG Copper, 90 degree rated, conductors (numbers as indicated) and a #12 AWG Copper ground conductor. Fixtures factory supplied with U.L. listed whip assemblies shall also be provided with the conductors as listed above.
 2. Contractor may use a pre-manufactured flexible wiring system for light fixture connections. System shall be similar to "AFC" systems and shall not be used for switch drops or systems other than lighting.
 3. If tandem wired fixtures are used, the maximum whip length between fixtures for electronic ballasts shall be 9 feet.
- I. Wipe fixtures, lamps, lens, and louvers clean at end of project completion.
- J. General Contractor shall provide fireproofing around recessed fixtures installed in fire-rated ceilings per U.L. requirements, Electrical Contractor shall coordinate.
- K. Exterior fixtures shall be constructed with gasketed shield and be "bugtight".
- L. Provide thermal switches on all recessed fixtures as required by N.E.C.
- M. Where fluorescent fixtures are mounted in continuous rows, each row shall be supplied with 2 #12 AWG & 1 #12 AWG "green" ground, 90 degree C. rated, Copper conductors, all within 1/2" flexible steel conduit. Feed through wiring shall also be #12 AWG. 90 degree C. copper. Where flexible steel conduit is to be used, all fittings shall be U.L. labeled for the purpose.

END OF SECTION 26 51 00

SECTION 27 00 00 – COMMUNICATIONS SYSTEMS (CONDUIT)

PART 1 - GENERAL

1.1. SUMMARY:

- A. Scope: Extent of communications systems work is indicated by drawings, specifications, and details, and as hereby defined to include, but not be limited to telephone, data, and CATV conduits, boxes, terminals, and other associated equipment and hardware.
- B. Provide submittals on all products specified with this section.
- C. All cabling materials, cabling, electrical ends, jacks, patch panels, racks, etc. will be provided and installed by the Contractor or his sub-contractor, unless otherwise noted on the drawings or in the specifications. Cable installer shall be certified for system installed.

1.2. QUALITY ASSURANCE:

- A. Codes and Standards: Conform to the following:
 - 1. National Electrical Code (NEC): comply with applicable local code requirements of the authority having jurisdiction and NEC.
 - 2. This installation must be done according to the requirements of the local system supplier and the general specifications contained herein. Consult the serving installers to verify all requirements.

PART 2 – PRODUCTS

2.1. TELEPHONE SYSTEM:

- A. Outlets: All telephone outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim. Telephone coverplates to be as furnished by contractor unless noted otherwise on the drawings. All floor outlets shall be adjustable water-tight floor box, installed in existing underfloor raceway system. All telephone outlet boxes to be located as directed. Telephone outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.
- B. Each telephone outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. Where combination telephone/data outlets are noted on the drawings, provide only one 1" empty conduit with pull wire, unless noted otherwise on the drawings. Telephone conduits shall be stubbed into ceiling void, if entire ceiling void is accessible and not an air return plenum. Install insulated bushing on end of conduit in ceiling voids. Telephone conduits shall be routed to the telephone terminal board if ceiling void is not accessible, is an air return plenum, or ceiling void is not accessible for full distance to the telephone terminal board. Install insulated bushing on end of conduit at terminal board. Verify conditions of job prior to rough-in.

- C. Provide telephone terminal board and racks as shown on the drawings. Board shall be 3/4" fire resistant plywood sized as required by telephone system supplier, minimum 4' x 4'. Telephone terminal board to be mounted on wall and painted with two coats of fire resistant non-conductive paint, color as selected by Architect.

2.2. DATA OUTLET SYSTEM:

- A. Section 2.2 will only apply if there are data outlets shown on the drawings.
- B. Outlets: All data outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim. Coverplates to be as furnished by contractor unless noted otherwise on the drawings. All data outlet boxes to be located as directed. Data outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.
- C. Each data outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. Where combination telephone/data outlets are noted on the drawings, provide only one 1" empty conduit with pull wire, unless noted otherwise on the drawings. Data conduits shall be stubbed into ceiling void, if entire ceiling void is accessible and not an air return plenum. Install insulated bushing on end of conduit in ceiling voids. Data conduits shall be routed to the data terminal board if ceiling void is not accessible, is an air return plenum, or ceiling void is not accessible for full distance to the data terminal board. Install insulated bushing on end of conduit at terminal board. Verify conditions of job prior to rough-in.
- D. Provide data terminal racks as shown on the drawings. Unless shown otherwise on the drawings, data terminal racks shall be mounted 24" from wall.

2.3. CATV (TELEVISION) OUTLET SYSTEM

- A. Section 2.3 will only apply if there are CATV outlets shown on the Drawings.
- B. Outlets: All CATV outlet boxes shall be installed with 4" square, minimum 2 1/8" deep box and trim, with separately mounted 20 amp 125 volt duplex grounded receptacle adjacent to CATV outlet. CATV coverplates to be as furnished by CATV system supplier unless noted otherwise on the drawings. All floor outlets shall be adjustable water-tight floor box, per Section 26 05 30. All CATV outlet boxes to be located as directed. CATV outlet boxes not used shall be provided with blank cover plates to match switch and receptacle plates.
- C. Each CATV outlet box location requires (1) 1" empty conduit with pull wire unless noted otherwise. CATV conduits shall be stubbed into ceiling void, if entire ceiling void is accessible and not an air return plenum. Install insulated bushing on end of conduit in ceiling voids. CATV conduits shall be routed to the CATV terminal board if ceiling void is not accessible, is an air return plenum, or ceiling void is not accessible for full distance to the CATV terminal

board. Install insulated bushing on end of conduit at terminal board. Verify conditions of job prior to rough-in.

PART 3 – EXECUTION

- A. Provide and install cables in all Communication Systems conduits. Provide tags on all cables to indicate termination of wire or conduit.
- B. Provide and install pull boxes at all locations as required.
- C. Provide and install conduit sleeves thru floors and walls as required for the system provider. Vertical conduits/sleeves through closets floors shall terminate not less than 3-inches above the floor and not less than 3-inches below the ceiling of the floor below.
- D. All conduit ends shall be equipped with non-metallic insulated bushings.
- E. Terminate conduit runs to/from the associated telephone, data, or CATV backboard in a closet or designated space at the top or bottom of the backboard. Conduits shall enter closets next to the wall and be flush with the backboard.
- F. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.
- G. All empty conduits located in equipment closets or on backboards shall be sealed with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.
- H. Conduit runs shall contain no more than four quarter turns (90 degree bends) between pull boxes/backboards.

END OF SECTION 27 00 00