PROJECT MANUAL

West Ada School District
I.T. DEPARTMENT
OFFICE REMODEL

BID SET

1303 E. Central Dr.
Meridian, Idaho 83642

January 30, 2018
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ARCHITECT:

LKV Architects
2400 E. Riverwalk Drive
Boise, Idaho 83706

Phone: (208) 336-3443
Fax: (208) 336-3680
Contact: Toby Norskog, Project Manager
toby@lkvarchitects.com

MECHANICAL ENGINEER:

Musgrove Engineering
234 Whisper Wood
Boise, Idaho 83709

Phone: (208) 384-0585
Fax: (208) 384-0765

ELECTRICAL ENGINEER:

Musgrove Engineering
234 Whisper Wood
Boise, Idaho 83709

Phone: (208) 384-0585
Fax: (208) 384-0765
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ADVERTISEMENT FOR BIDS
INFORMATION SERVICES DEPARTMENT REMODEL
BID # 804701

The Board of Trustees of West Ada School District is soliciting sealed bids for the Remodel of the Information Services Department. Bids will be received, opened and read aloud at the District Service Center, 1303 East Central Drive, Meridian, Idaho, 83642, on Friday, February 16, 2018 at 10:00 AM MDT. Bidders and other interested parties are invited to be present at the bid opening. Bids received after the bid opening time will not be considered and no bidder may withdraw his/her bid after the time set for opening or before bid award unless said award is delayed for a period exceeding sixty (60) days.

A pre-bid meeting will be held at the job site located at 1303 E Central Drive, Meridian, ID, 83642 on Friday February 9, 2018 at 10:00 AM MDT. Attendance is recommended.

Specifications, including bidding documents, specific instructions for submission of bids, and conditions of agreement, are available from LKV Architects located at 2400 E Riverwalk Dr, Boise, ID 83706. (208) 336-3443.

Each bid exceeding $50,000 must be accompanied by a bid bond with a surety company licensed to do business in Idaho or a certified/cashier’s check drawn on an Idaho Bank in an amount not less than five per cent (5%) of the total bid, made payable to West Ada School District. In the event of the successful bidder’s failure to execute the contract, this bid surety may be forfeited to West Ada School District at the sole discretion of the Board of Trustees.

The Board of Trustees of West Ada School District reserves the right to disregard all non-conforming, non-responsive or conditional bids, to waive any minor informalities/irregularities, to reject all bids, or to accept the bid or bids it deems best.

Bidders shall be licensed in the State of Idaho, in accordance with the provisions of the Public Works Contractor’s State License Law, Title 54, Chapter 19, Idaho Code Amended. The term “Public Works” includes general, sub, or specialty contractors. The bidder’s name must agree to the name on the Public Works License that is referenced in the bid.

The successful Contractors shall carry out his employment practices and payment of wages according to the provisions set forth in Idaho Code 44-1001, Employment of Residents of Idaho – Wage Scale – Federal Funds.

Dated January 26, 2018
Mike Carrithers
Purchasing Agent
West Ada School District

Publish January 31, 2018 and February 7, 2018
INVITATION TO BID

1.1 PROJECT INFORMATION

A. Notice to Bidders: Qualified bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

   1. Project Location; 1303 E. Central Drive, Meridian, Idaho 83642.

C. Owner: West Ada School District, 1303 E. Central Drive, Meridian, Idaho 83642.

   1. Representative: Toby Norskog, (208) 336-3443.

E. Project Description; Project consists of;
   1. Demolition of existing partitions, millwork, and finishes.
   2. Construction of new partitions, interior hollow metal door and window frames, suspended ceiling, fixtures, painting and flooring, mechanical, plumbing, electrical and fire alarm modifications.

F. Construction Contract; Bids will be received for the following Work:

1.2 BID SUBMITTAL AND OPENING

A. Architect will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Architect, and delivered as follows;
   1. Bid Date: Friday, February 16, 2018
   2. Bid Time: 10:00 AM
   3. Location: District Service Center, 1303 E. Central Drive Meridian, Idaho 83642

1.3 BID SECURITY A.

   Bid security in the amount of 5% of the total bid amount is required.

1.4 PREBID CONFERENCE

A. A prebid conference for all bidders will be held at the job site located at 1303 E. Central Drive, Meridian, Idaho 83642 on Friday, February 9, 2018 at 10:00 AM local time. Prospective bidders are encouraged to attend.
1.5 DOCUMENTS

A. Electronically produced (on-line) Contracting Documents: May be obtained after **February 1, 2018** by contacting *Architect*. Electronic Documents will be provided to bidders at no deposit. Printed Documents may be obtained from *Architect* for a refundable document deposit of $100.00.

1.6 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. Work is subject to liquidated damages of $500/consecutive day after substantial completion date.

PROJECT SCHEDULE:

- Start Construction On-Site: **June 6, 2018**
- Substantial Completion: **August 10, 2018**
- Final Completion: **August 17, 2018**

1.7 BIDDER'S QUALIFICATIONS

A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance required for the Work. A Performance Bond and a separate Labor and Material Payment Bond are required. Insurance in a form acceptable to Owner will be required as well as signed National Sex Offender Registry Form and Contractor's Affidavit Concerning Alcohol & Drug-Free Workplace of the successful Bidder.
INSTRUCTIONS TO BIDDERS

AIA Document A 701, Instructions to Bidders, 1997 Edition, is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document A 701 are available for review at the office of the Owner and Architects. Copies of the document may be purchased from the American Institute of Architects or its local distributor.
SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements modify, change, delete from or add to the Instructions to Bidders, AIA Document A701 - 1997. Where any Article of the Instructions to Bidders is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by the Supplementary Instructions to Bidders, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 2  BIDDER’S REPRESENTATIONS

Add to Article 2 the following:

2.1.5  The bidder is qualified, sufficiently staffed, properly equipped, approved where required, and is properly licensed to perform the work.

ARTICLE 3  BIDDING DOCUMENTS

Add to Article 3, the following:

3.2.4  Bidders and Sub-bidders shall field verify all dimensions pertaining to the Work and shall be responsible for the determination of all quantities of materials required for the completion of the Work. The bidder shall not rely on the scale drawings nor on indicated dimensions on the Bidding Documents in his determination of required materials quantities. No allowance shall be made for Bidder’s failure to field verify dimensions.

Revise Paragraph 3.4.3 to read as follows:

3.4.3  Addenda will be issued not later than 4 days except for an Addendum withdrawing the request for bids or one which includes postponement for the date for receipt of Bids.

ARTICLE 4  BIDDING PROCEDURES

Add to or supplement Article 4, the following:

4.1.8  Bidder shall prepare and submit his bid based on compliance with Executive Order 2006-40 and shall warrant that the bidder does not knowingly hire or engage any illegal aliens or persons not authorized to work in the United States; bidder takes steps to verify that it does not hire or engage any illegal aliens or persons not authorized to work in the United States; and that any misrepresentation in this regard or any employment of persons not authorized to work in the United States constitutes a material breach and shall be cause for termination of any contract resulting from his bid.

4.2.1  Delete the last sentence.

4.2.1.1  To be considered, proposals must be accompanied by an acceptable security, in an amount not less than five (5) percent of the total amount of the bid including add alternates. The security may be in the form of a bond, or a certified or cashier’s check.

4.2.1.2  A successful bidder, who fails to sign the contract for the work or furnish the required bonds within 10 days following the receipt of notice of intent to award a contract, shall forfeit the security. The owner may then award the contract to the next lowest bidder.
4.2.2 A standard surety bid bond form meeting all the conditions of AIA Document A310 is acceptable.

4.2.3.1 The specified time for retainage of the bid security is 45 days after the opening of bids, so long as the bidder has not been notified of the acceptance of the bid.

4.3.1.1 The mailing envelope containing the bid shall be addressed as follows:

West Ada School District  
District Office  
1303 E. Central Drive  
Meridian, Idaho 83642

4.3.5 Along with his bid the bidder shall submit an affidavit certifying his compliance with Idaho Code, Title 72, Chapter 17, requiring the contractor and his subcontractors at the time of bid to provide a drug-free workplace program and to maintain such program throughout the duration of the contract.

ARTICLE 5 CONSIDERATION OF BIDS

Add to Article 5, the following:

5.4 PUBLIC WORKS CONTRACTORS LICENSE

This Public Works project is not financed in whole or in part by Federal Aid Funds. Bid Proposals will be accepted from those contractors only (prime contractors, subcontractors, and/or specialty contractors) who, prior to the bid opening, hold current licenses as public works contractors in the State of Idaho.

5.5 EMPLOYMENT PRACTICES

Bids shall be based on the provisions of Section 44-1001 and 44-1002 of the Idaho Code dealing with labor preference.

5.6 NAMING OF SUBCONTRACTORS

Section 67-2310, Idaho Code, requires general (prime) contractors to include in their bid the name of the subcontractors who shall, in the event the contractor secures the contract, subcontract the plumbing, heating and air conditioning, and electrical work under the general (prime) contract. Failure to name subcontractors, as required, shall render any bid submitted by a general (prime) contractor unresponsive and void. Subcontractors named in accordance with the provisions of this section must possess an appropriate license or certificate of competency issued by the State of Idaho covering the contractor work classification in which the subcontractor is named.

The bidder shall complete Bid Proposal in its entirety for all categories of work listed and shall name the entity that will perform the work. Failure to complete Bid Proposal in full shall render a bid unresponsive and void.

With regard to possessing an appropriate license or certificate of competency all subcontractors listed by the general (prime) contractor must have at the time of the bid opening a current license in the appropriate category (class, type and specialty category) as issued by the Public Works Contractors State License Board. In addition, subcontractors shall have at the time of the bid opening a valid contractor’s license as issued by the Idaho Division of Building Safety for their category or categories of work, as applicable.
5.7 I D A H O  D O M I C I L E D  C O N T R A C T O R S

Section 67-2348, Idaho Code, requires the Owner to apply a preference in determining which contractor submitted the lowest responsible bid. If the contractor who submitted the lowest dollar bid is domiciled in a state which has preference law which penalizes Idaho domiciled contractors then the Division of Public Works must apply preference. The preference that will be applied is the preference law of the domiciliary state of the contractor who submitted the lowest dollar bid.

Generally speaking, a contractor's domiciliary state is the state in which the contractor's home office is located. If federal funds are involved in the project then no preference will be used.

A RT I C L E  6  P O S T  B I D  I N F O R M A T I O N

Add to Article 6, the following:

6.3.5 Prior to the award of the contract, the contractor shall submit to the Owner the Contractor’s fully executed Affidavit Concerning Taxes. The form for such Contractor’s Affidavit Concerning Taxes follows these Supplementary Instructions.

6.3.7 Prior to the award of the Contract the Contractor shall submit to the Owner the following certificates of proof thereof: Liability Insurance, Workers’ Compensation Insurance, Performance Bonds, Material Payment Bonds.

Delete paragraph 6.2

A RT I C L E  7  P E R F O R M A N C E  B O N D  A N D  P A Y M E N T  B O N D

Modify and add to Article 7, the following:

In subparagraph 7.2.1, in the first sentence, delete “three days following the date of execution of the Contract” and substitute “ten days following the receipt of Notice of Intent to Award”.

7.2.2.1 Performance bond and labor and material payment bond are required for this project; each in an amount of not less than 100% of the contract amount, and by a surety company authorized to do business in Idaho.

End of Supplementary Instructions to Bidders
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PREBID MEETINGS

1.1 PREBID MEETING

A. Architect will conduct a Prebid meeting as indicated below:

1. Meeting Date: **Friday, February 9, 2018**
2. Meeting Time: **10:00 AM**
3. Location: **Front lobby of District Service Center, 1303 E. Central Drive, Meridian, Idaho, 83642.**

B. Attendance:

1. Bidders: Attendance at Prebid meeting is not mandatory.

C. Bidder Questions: Submit written questions to be addressed within 2 days after the Prebid meeting.

D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

1. Procurement and Contracting Requirements;

   a. Advertisement for Bids.
   b. Instructions to Bidders.
   c. Bonding.
   d. Insurance.
   e. Bid Form and Attachments.
   f. Bid Submittal Requirements.

2. Schedule:

   a. **PROJECT SCHEDULE:**

      Start Construction On-Site: **June 6, 2018**
      Substantial Completion: **August 10, 2018**
      Final Completion: **August 17, 2018**

   b. Liquidated Damages - $500/consecutive day after substantial completion date.
WEST ADA SCHOOL DISTRICT
I.T. DEPARTMENT OFFICE
REMODEL

TO: West Ada School District
Meridian, Idaho

Bidders:

The Bidder, in compliance with your invitation for bids for the West Ada School District I.T. Department Office Remodel project, having examined the bidding and contract documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to provide the service and insurance in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents.

The Bidder hereby agrees to commence work under this contract on a date to be specified in a written “Notice to Proceed” by the Owner, to commence on-site construction work on or about June 6, 2018, and to substantially complete the project by August 10, 2018 and final completion on August 17, 2018. The Bidder further agrees to pay as liquidated damages, the sum of $500.00 for each consecutive calendar day after the established substantial completion date or adjusted date as established by change order, as hereinafter provided in Subparagraph 9.11.1 of the Supplementary Conditions.

Bidder acknowledges receipt of Addenda No. (s) ____________________.

BID PROPOSAL: The Bidder agrees to perform all of the work described in the Specifications and shown on the Drawings for the sum of________________________
________________________________________ Dollars($______________________).

(Amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

The Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informality in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 45 calendar days after the scheduled closing time for receiving bids.

BID PROPOSAL

BP - 1
Upon receipt of written notice of the acceptance of this bid, Bidder will execute the required construction contract within 10 days and deliver a Surety Bond or Bonds as required by Article 7 of the Instructions to Bidders as modified by the Supplementary Instructions to Bidders.

The bid security attached in the amount of 5% of the bid amount is to become the property of the Owner in the event the contract and bond are not executed within the time set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Pursuant to Section 67-2310, Idaho code, commonly known as the naming law, the names and addresses of the entities who will perform plumbing and electrical work, subject to approval of Owner and Architect, if undersigned is awarded the contract, area as follows:

Plumbing Contractor Name _____________________________________________
Address __________________________________________________________
Idaho Public Works Contractors License No. _____________________________
Idaho Plumbing Contractors License No. _______________________________

Heating, Ventilating, & Air Conditioning (HVAC) Name _______________________
Address __________________________________________________________
Idaho Public Works Contractors License No. _____________________________
Idaho HVAC Contractors License No. _________________________________

Electrical Contractor Name _____________________________________________
Address __________________________________________________________
Idaho Public Works Contractors License No. _____________________________
Idaho Electrical Contractors License No. _______________________________

FAILURE TO NAME A PROPERLY LICENSED CONTRACTOR IN EACH OF THE ABOVE CATEGORIES WILL RENDER THE BID UNRESPONSIVE AND VOID.

Should the listing of contractors change due to selection of alternates or other similar circumstances, attach explanation.
The Undersigned notifies that he is of this date duly licensed as an Idaho Public Works Contractor and further that he possesses Idaho Public Works Contractor's License No. _______________________, and is domiciled in the State of _______________________.

Dated this ________ day of_____________,_______.

(date) (month) (year)

Respectfully submitted by:

______________________________
(Company)

______________________________
(Business Address)

______________________________
(Authorized Signature)

______________________________
(Title)

______________________________
(Telephone Number)

______________________________
(FAX Number)

END OF BID PROPOSAL

BID BOND
BIDDER'S ACKNOWLEDGEMENT STATEMENT
CONTRACTOR'S AFFIDAVIT CONCERNING ALCOHOL
AND DRUG-FREE WORKPLACE
NATIONAL SEX OFFENDER REGISTRY

ARE ATTACHED
BIDDER'S ACKNOWLEDGMENT STATEMENT

Be sure to include this document and all documents called for on this document in your Bid Proposal envelope.

Job Name: West Ada School
District Office
I.T. Department Office Remodel
1303 E. Central Drive
Meridian, Idaho 83642

Bid Date: ______________________
Pre-Bid Tour Date: ________________

Check each Box - Description

By submitting a bid for this Project, the undersigned bidder agrees that, if awarded the Contract for construction, Contractor will conform to all conditions and requirements of the Contract, including but not limited to:

☐ Contractor agrees to comply with conditions pertaining to Section 44-1001 and 44-1002, Idaho Code, regarding the employment of ninety-five percent (95%) bona fide Idaho residents and providing for a preference in the employment of bona fide Idaho residents and with Executive Order 2009-10 regarding the employment of persons not authorized to work in the United States.

☐ Contractor will substantially complete the Work within the time stated in the Contract Documents, or as modified by Change Order(s).

☐ If the Contractor fails to substantially complete the Project within the time stated in the Contract Documents, or as modified by Change Order, the Contractor agrees that the Owner may deduct from the Contract amount liquidated damages in the amount per calendar day, indicated in the Contract Documents, times the number of calendar days until the Project is Substantially Complete, as defined in the Contract Documents and as determined by the Design Professional.

The Contractor agrees that Change Orders are governed by the AIA Document A107-2007, Between Owner and Contractor including as follows:

1. By the execution of a Change Order, the Contractor agrees and acknowledges that it has had sufficient time and opportunity to examine the change in Work which is the subject of the Change Order and that it has undertaken all reasonable efforts to discover and disclose any concealed or unknown conditions which may, to any extent, affect the Contractor's ability to perform in accordance with the Change Order. Aside from those matters specifically set forth in the Change Order, the Owner shall not be obligated to make any adjustments to either the Contract Sum or Contract Time by reason of any conditions affecting the change in Work addressed by the Change Order that could have reasonably been discovered or disclosed by the Contractor's examination.

2. Any Change Order fully executed by the Owner, Contractor and Design Professional, including but not limited to, a Change Order arising by reason of the parties' mutual agreement or by mediation, shall constitute a final and full settlement of all matters relating to or affected by the change in the Work, including but not limited to, all direct and consequential costs associated with such change and any and all adjustments to the Contract Price and Contract Time. In the event a Change Order increases the Contract Price, the Contractor shall include the Work covered by such Change Order in the Application for Payment as if such Work was originally part of the Project and Contract Documents.
Fill out and include in Bid Proposal envelope.

- National Sex Offender Registry - fill out and include in Bid Proposal envelope.
- Contractor's Affidavit Concerning Alcohol and Drug-Free Workplace - fill out and include in Bid Proposal envelope.
- Bid Form - Fill out all required information, initial all changes, etc.
- Acknowledge each Addendum - Example: Addendum #1, #2 and #3. NOT "3 Addenda
- Are all blank spaces filled out on Bid Form?
- Have questions arising from the bidding, contract, specification or plans been submitted to the proper authority and resolved in the proper manner?
- Are bid amounts shown correctly as well as extensions and totals? Recheck for errors or omissions. Both lump sum and alternate lump sum prices must be in figures.
- Are authorized signatures properly affixed to the bidding documents, giving also title, Idaho Contractor's License number, etc.?
- Have the required Bid Submittal forms been reviewed and compiled with?
- In order for a bid to be considered, all bidding documents must be placed in a properly addressed, sealed and labeled envelope and delivered to the specified authority prior to the time designated for the bid opening.

FAILURE TO EXECUTE THIS ACKNOWLEDGMENT MAY MAKE YOUR BID NONRESPONSIVE.

I, ____________________________________________, being duly authorized to bind the bidder, ____________________________________________, does hereby certify that I have fully read and understand this document and that it highlights certain parts of the Contract that will be entered between the parties and that will govern this Project.

Authorized Signature: ______________________________________

Title:

Date:

END OF BIDDER'S ACKNOWLEDGMENT STATEMENT
Idaho Code §18-8329 prohibits any person who is registered or required to register under the Idaho Sex Offender Registration Act from being on school property if the person has reason to believe children under the age of 18 are present. West Ada School District Policy 504.81 reads as follows:

_It is prohibited for any person to: apply for or to accept employment, or to volunteer at a school; or to be upon or to remain on the premises of a school or facility owned by West Ada School District while children are present, other than to drop off or pick up the person’s child or children if the person is currently registered or is required to register under the sex offender registration act as provided in chapter 83, title 18, Idaho Code._

As a provider of goods and/or services to the West Ada School District, your company and those in your employment are subject to this law and district policy.

Please sign and return this letter confirming to the District that your company will prohibit any persons in your employ who are registered or required to register under the Idaho Sex Offender Registration Act from participation in company business with the District if such participation would require them to be present on school property. Further, by signing, you confirm that you have cross checked such employees against the National Sex Offender Registry found at the following web link:

_http://www.nsopr.gov/_

_______________________________________  _____________________
Company/Contractor Name (Print)                                  Printed Name                                  Date

________________________________________
Signature of Company/Contractor Representative

Signed document must be included in sealed bid envelope
STATE OF ______________________  
COUNTY OF ____________________

Pursuant to the Idaho Code, §72-1717, I, the undersigned, being duly sworn, depose and certify that __________________________ is in compliance with the provisions of Idaho Code title 72, chapter 17; that ______________________________ provides a drug-free workplace program that complies with the provisions of Idaho Code, title 72, chapter 17 and will maintain such program throughout the life of a state construction contract and that ______________________________ shall subcontract work only to subcontractors meeting the requirements of Idaho Code, §72-1717(1)(a).

Name of Contractor

________________________________

Address

________________________________

City and State

________________________________

By: __________________________________________
(Signature)

Subscribed and sworn to before me this _____________________ day of ____________, ______.

Commission expires:

________________________________

NOTARY PUBLIC, residing at

________________________________

________________________________

INCLUDE WITH BID FORM
GENERAL CONDITIONS

AIA Document A201, General Conditions of the Contract for Construction, 2007 Edition, is hereby included by reference and shall be a part of the Contract Documents. Copies of AIA Document A201 are available for review at the offices of the Owner and Architect. Copies of the document may be purchased from the American Institute of Architects or its local distributor.
SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction", AIA Document A201, 2007. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 2  OWNER

2.1 General

Add to 2.1.1 the following:

2.1.1.1 West Ada School District, Meridian, Idaho shall be the sole representative of the Owner, and here and after shall be designated as the Owner. Wherever in these specifications and contract the term "Owner" shall mean West Ada School District, Meridian, Idaho as represented by an authorized representative.

2.2 Information and Services Required of the Owner

Delete subparagraph 2.2.1

Add the following Subparagraph 2.2.2.1:

2.2.2.1 The Owner will pay directly to the City of Meridian and other local jurisdictions any and all fees for plan review and building permits. The Contractor shall apply and pay for permits and inspections required by entities of State government, if required, and mechanical, plumbing, electrical permits required by the City of Meridian.

Revise subparagraph 2.2.2 as follows:

2.2.2. The Owner will pay for any permits and fees required by local jurisdictional agencies for the project.

Delete subparagraph 2.2.3

Delete subparagraph 2.2.5 and substitute the following:

2.2.5 The Contractor will be furnished free of charge ten (10) copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3  CONTRACTOR

3.2 Review of Contract Documents and Field Conditions by Contractor

Delete subparagraph 3.2.1 in its entirety.

Delete subparagraph 3.2.2 in its entirety and replace with the following:
3.2.2 The Contractor shall carefully study and compare the various Drawings and other Contract Documents relative to the Work, as well as any information furnished by the Owner pursuant to Subparagraph 2.2.3, as modified, shall take field measurements of any existing conditions related to the Work and shall observe conditions at the site affecting the Work. Within ten (10) days from the Notice to Proceed, the Contractor shall certify in writing to the Architect that it has made the review required under this Subparagraph 3.2.2 and that it has discovered no errors, omissions or inconsistencies or identifying in as much detail as possible all errors, omissions, or inconsistencies the Contractor has discovered. Contractor shall have a continuing obligation during the Project to advise the Architect of any errors, omissions or inconsistencies it discovers. It is recognized that the Contractor’s review is made in its capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes and rules and regulations, but is for the purpose of identifying issues that could affect constructability, scheduling or cost, where such issues could be expected to be identified by a contractor with experience in projects of a similar size and nature.

Delete subparagraph 3.2.3 in its entirety and replace with the following:

3.2.3 If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by the Architect in response to the review and certification required by Subparagraph 3.2.2, the Contractor shall make Claims as provided in Subparagraphs 4.3.6 and 4.3.7. No claim for additional time will be allowed with regard to the time required to complete the review and certification requirements of Subparagraph 3.2.2. A failure by the Contractor to provide the written certification as required shall constitute a substantial breach of the Contract and may result in termination for cause. If the Contractor fails to perform its obligations under Subparagraph 3.2.2, a subsequent claim for additional costs, damages or time that is related to such error, omission or inconsistency may be denied.

3.6 Taxes

Add to 3.6 the following:

3.6.2 The Contractor, in consideration of securing the business of erecting or constructing public works in this State, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the state when taxes, excises, or license fees to which he is liable become payable, agrees:

1. To pay promptly when due all taxes (other than on real property), excises and license fees due to the state, its sub-divisions, and municipal and quasi-municipal corporations therein, accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term;

2. That if the said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists even though the same constitute liens
upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and

3. That, in the event of his default in the payment or securing of such taxes, excises, and license fees, to consent that the department, officer, board, or taxing unit entering into this contract may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said contractor is liable.

3.6.3 Before entering into a contract, the Contractor shall be authorized to do business in the state and shall submit a properly executed Contractor's Affidavit Concerning Taxes. (Page CA-1, included in the Project Manual).

3.6.4 Within ten days of receipt of forms from Owner, Contractor shall complete and return to Owner forms as required by tax collector, showing dates, names, addresses, contracting parties, including all subcontractors, and all other relevant information, which may be required.

3.7 Permits, Fees and Notices and Compliance with Laws

Delete subparagraph 3.7.1 and substitute the following:

3.7.1 The Contractor shall pay for any and all plumbing and electrical permits and inspections required by the Idaho Division of Building Safety and the City of Meridian. The Owner shall apply for, pay for, and obtain general building and other permits and inspections required by the City of Boise and local jurisdictions. Refer to Supplementary Condition 2.2.2.1 for permit fees paid by the Owner. The Owner shall also pay all fees and charges for the use of municipal property for storage of materials, parking, utility services, temporary obstructions, enclosures, refuse disposal, opening and patching of streets, etc., off of the property of the Owner arising from the construction and completion of the Work.

3.12 Shop Drawings, Product Data and Samples

In subparagraph 3.12.10, in the third sentence, delete “the Owner and”.

ARTICLE 4 ARCHITECT

4.2 Administration of the Contract

Delete subparagraph 4.2.10 and substitute the following:

4.2.10 The Architect will provide a project representative and indicate the limitations of his authority during the construction of the Work.

ARTICLE 7 CHANGES IN THE WORK

7.2 Change Orders

Add to 7.2 the following:
7.2.2 The amount allowed for overhead and profit on any change order is limited to the amounts indicated in subparagraph 7.3.11 of these Supplementary Conditions.

7.2.3 Any Change Order prepared, including but not limited to those arising by reason of the parties’ mutual agreement or by mediation, shall constitute a final and full settlement of all matters relating to or affected by the change in the work, including, but not limited to, all direct, indirect and consequential costs associated with such change and any and all adjustments to the Contract Sum and Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the work covered by such Change Order in the Application for Payment as if such work were originally part of the Project and Contract Documents.

7.2.4 By the execution of a Change Order, the Contractor agrees and acknowledges that he has had sufficient time and opportunity to examine the change in work which is the subject of the Change Order and that he has undertaken all reasonable efforts to discover and disclose any concealed or unknown conditions which may to any extent affect the Contractor’s ability to perform in accordance with the Change Order. Aside from those matters specifically set forth in the Change Order, the Owner shall not be obligated to make any adjustments to either the Contract Sum or Contract Time by reason of any conditions affecting the change in work addressed by the Change Order, which could have reasonably been discovered or disclosed by the Contractor’s examination.

7.3 Construction Change Directives

In subparagraph 7.3.5 after the word "Architect" insert the following words: "in writing within forty-eight hours." .... The balance of the subparagraph remains unchanged.

In subparagraph 7.3.6, in the last sentence, delete “recorded as a” and substitute “incorporated into a future”.

In subparagraph 7.3.7, in the first sentence, delete the words “as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount” and substitute the words “an allowance for overhead and profit in accordance with subparagraph 7.3.11 of these Supplementary Conditions.” In the second sentence after the words “In such case,” add the words “of an increase in Contract Sum”.

In subparagraph 7.3.9 delete the last two sentences.

Add to 7.3 the following:

7.3.11 For purposes of subparagraphs 7.2.2. and 7.3.7 of these Supplementary Conditions, the allowance for combined overhead and profit shall be limited as follows, unless otherwise provided in the Contract Documents:

.1 for total changes of $10,000 or less in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier, combined shall not exceed twenty percent (20%) of direct costs.

.2 for total changes exceeding $10,000 in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier, combined shall not exceed fifteen percent (15%) of direct costs.
.3 the Contractor will determine the apportionment between the Contractor and its subcontractors of allowable amounts of overhead, profit, bonds and insurance.

ARTICLE 8 TIME

8.1 Definitions

Add to subparagraph 8.1.1 the following:

8.1.1.1 The Contractor shall commence work under this contract on a date to be specified in a written Notice to Proceed by the Owner and shall commence on-site construction work on or about ____________. The Contractor shall substantially complete the work, as defined by Subparagraph 9.8.1, on or before ____________.

In subparagraph 8.1.2, delete the word "Agreement" and substitute the words "Notice to Proceed".

8.3 Delays and Extensions of Time

In subparagraph 8.3.1 delete the words "and arbitration".

Delete subparagraph 8.3.3 and substitute the following:

8.3.3 Notwithstanding any term, condition or provision to the contrary in this Contract, the remedies available to the Contractor for adjustments of Contract Time and Contract Sum by reason of delay shall be those set forth in these Supplementary Conditions.

8.3.4 If the Contractor submits a progress report or schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

ARTICLE 9 PAYMENTS AND COMPLETION

9.3 Applications for Payment

Add to 9.3.1. the following:

9.3.1.3 The form of Application for Payment shall be AIA Form G702 or another form acceptable to both Owner and Architect.

Add to 9.3.2 the following:

Off site storage will not be approved at locations more than thirty (30) miles from the project site or outside the State. Any materials stored off site and paid for by the Owner shall be physically marked as being the property of the Owner. The Contractor must provide at least thirty (30) days advance written notice of its request to store off site. Such notice must include a description of the type, quantities, locations, and values of materials involved for the next billing cycle. All requests for payment must indicate the type, quantities, and value
of materials or equipment for which payment is requested. The Architect must have unrestricted access to the stored materials during all business hours and may physically inventory all invoice materials and may physically inspect the storage conditions. The Contractor must provide written consent of surety to off-site storage of materials and equipment and to payment for such materials and equipment prior to incorporation in the Work. Consent must be of surety. Consent of local broker or agent is not acceptable. The Contractor must maintain and must provide to the Architect, upon request, a current log of stored materials and equipment, which reflects when materials are used or added. The Contractor must obtain and maintain on all materials and equipment stored off-site and in transit all risk property insurance at replacement cost, with the Owner listed as loss payee.

9.6 Progress Payments

Add to 9.6.1 the following:

9.6.1.1 Until conditions set forth in paragraph 9.10 are met, the Owner shall pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments. If the Architect determines that the Contractor has made or is making satisfactory progress on any uncompleted portions of the work, the Owner may, at its discretion, release a portion of the retainage to the Contractor prior to the actual final completion of the conditions set forth in Paragraph 9.10.

9.6.1.2 Progress Payments shall fall due thirty (30) days after the Architect’s Certificate for Payment is received by the Owner.

Add to 9.6.2 the following:

9.6.2.1 The Contractor shall not withhold from a subcontractor or supplier more than the percentage withheld from a payment certificate for the subcontractor’s or supplier’s portion of the work.

Delete subparagraph 9.6.7

9.7 Failure of Payment

Delete paragraph 9.7

9.8 Substantial Completion

In subparagraph 9.8.5 delete the last two sentences.

9.10 Final Completion and Final Payment

In subparagraph 9.10.1, delete the words “… and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable.” from the end of the first sentence.

Add to 9.10.1 the following:
9.10.1.1 The final retainage shall become due and payable to the Contractor in not more than thirty (30) days after issuance of the final Certificate for Payment by the Architect, provided that the conditions of subparagraph 9.10.2 are fully satisfied.

Add to Article 9 the following:

9.11 Liquidated Damages

9.11.1 The Owner will suffer financial loss in an amount that is difficult to quantify if the Project is not Substantially Complete on the date set forth in the Contract Documents. The Contractor (and his Surety) shall be liable for and shall pay to the Owner the sums hereinafter stipulated as fixed, agreed and liquidated damages, and not as a penalty, for each calendar day of delay until the Work is substantially completed:

Five Hundred DOLLARS ($500.00)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.1 Safety Precautions and Programs

Add to 10.1 the following:

10.1.2 The Contractor shall maintain, in compliance with Idaho Code, Title 72, Chapter 17, a drug-free workplace program throughout the duration of this contract and shall only subcontract work to subcontractors who have programs that comply with Idaho Code, Title 72, Chapter 17.

10.4 Emergencies

In subparagraph 10.6.1 delete the last sentence.

ARTICLE 11 INSURANCE AND BONDS

11.1 Contractor’s Liability Insurance

In subparagraph 11.1.1.1 substitute a comma for the semicolon at the end, and add the following: “including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;”

In subparagraph 11.1.1.2 delete the semicolon at the end, and add the following: “or persons or entities excluded by statute from the requirements of Clause 11.1.1.1 but required by the Contract Documents to provide the insurance required by that Clause;”

Add to 11.1.2 the following:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits:

1. Workers’ Compensation:
(a) State: Statutory

(b) Employer's Liability:
   - $100,000 per Accident
   - $500,000 Disease, Policy Limit
   - $100,000 Disease, Each Employee

2. Comprehensive or commercial general liability including premises operation; owners and contractors protective liability, products and completed operations liability, personal injury liability (including employee acts), broad form property damage liability and blanket contractual liability:

   (a) For any claim for bodily injury, property damage, personal injury or due to a contractual liability, limits of not less than $1 million per occurrence.

   (b) For products and completed operations coverage, coverage is to be maintained for a period of two (2) years following final payment.

   (c) For the hazards of explosion, collapse, and underground, commonly referred to as XCU, coverage shall be required if the exposures exist. This coverage may be provided by the subcontractor if the State and prime contractor are named as additional insureds.

3. Business auto liability (including owned, non-owned and hired vehicles) in an amount of not less than $1 million combined single limit.

4. If the General Liability coverages are provided by a Commercial Liability policy, the:

   (a) General Aggregate shall be not less than $1,000,000.

   (b) Fire legal liability shall be provided in an amount not less than $50,000 per occurrence.

5. Umbrella Excess Liability:

   An umbrella policy may be used in combination with other policies to provide a minimum coverage of $1,000,000.

   **11.1.2.3** The Contractor shall require all subcontractors of any tier to provide Commercial General Liability Insurance with liability limits of not less than $1,000,000 for bodily injury and property damage, and Business Automobile Liability Insurance for all owned, non-owned and hired vehicles with liability limits of not less than $1,000,000.

Add to 11.1.3 the following:

   **11.1.3.1** If this insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705, Certificate of Insurance or ACORD form 25. If this insurance is written on a Commercial General Liability policy form, ACORD form 25S will be acceptable.
11.3 Property Insurance

Delete subparagraph 11.3.1.2.

Beginning with subparagraph 11.3.1.5 delete the remainder of Paragraph 11.3 and substitute the following subparagraphs:

11.3.2 Loss of Use Insurance. The Owner, at the Owner’s option, may purchase and maintain such insurance as will insure the Owner against loss of the Owner’s property due to fire or other hazards, however caused.

11.3.3 Within thirty (30) days of Notice to Proceed, the Owner shall provide to the Contractor evidence of the insurance coverages required by this Paragraph 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least thirty (30) days’ prior written notice has been given to the Contractor.

11.3.4 Waivers of Subrogation. The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other and (2) the Architect, Architect’s consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages to the Work caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Paragraph 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner. The Owner or Contractor, as appropriate, shall require of the Architect, Architect’s consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The Owner does not waive its subrogation rights to the extent of its property insurance on structures or portions of structures that do not comprise the Work.

11.3.5 The Contractor authorizes the Owner to negotiate and agree on the value and extent of, and to collect the proceeds payable with respect to, any loss under a policy of insurance carried by the Owner pursuant to any of the provisions of this Paragraph 11.3. The Owner shall have full right and authority to compromise any claim, or to enforce any claim by legal action or otherwise, or to release and discharge any insurer, by and on behalf of the Owner and Contractor. The Owner shall provide written notice to Contractor of (i) its having reached any such settlement or adjustment with an insurer and (ii) the receipt of any funds pursuant to this Paragraph 11.3. Any objection by the Contractor to a settlement or adjustment made under this Paragraph 11.3 must be made in writing to the Owner within five (5) business days of the notice from the Owner. The Owner and the Contractor agree to attempt to resolve the dispute by mutual agreement.
11.3.6 A loss under the Owner's property insurance shall be adjusted by the Owner and made payable to the Owner for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause.

11.3.7 The Owner shall deposit proceeds so received, in a manner in which such proceeds can be separately accounted for, which proceeds the Owner shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

11.3.8 The Contractor shall pay Subcontractors their shares of the insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to acknowledge the Owner's authority under this Paragraph 11.3 and make payments to their Sub-subcontractors in similar manner.

11.3.9 Nothing contained in this Paragraph 11.3 shall preclude the Contractor from obtaining solely at its own expense, insurance on its behalf.

Add to Article 11 the following:

11.5 Indemnity

11.5.1 The Contractor shall indemnify, defend and save harmless the Owner, the Architect, and the Architect's Consultants from and against all claims, damages, costs, legal fees, expenses, actions and suits whatsoever including injury or death of others or any employee of the Contractor, subcontractors, or the sub-subcontractors, agents or employees, caused by failure to comply fully with any term or condition of the Contract, or caused by damage to or loss of use of property, directly or indirectly, by the carrying out of the work, or caused by any matter or thing done, permitted or omitted to be done by the Contractor, his agents, subcontractors or employees and occasioned by the negligence of the Contractor, his agents, subcontractors or employees.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 Governing Law

Add to 13.1 the following:

13.1.1 Each Contractor and his subcontractors and sub-subcontractors shall comply with all Idaho Statutes with specific reference to Public Works Contractor's State License Law, Title 54, Chapter 19, Idaho Code, as amended.

13.1.2 Pursuant to Sections 44-1001 and 44-1002, Idaho Code, it is provided that each Contractor "must employ ninety-five percent (95%) bona fide Idaho residents as employees, except where under such contracts fifty or less persons are employed, the Contractor may employ ten percent (10%) non-residents, provided, however, in all cases
employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association or corporation refusing to execute an agreement with the above-mentioned provisions in it; provided that in contracts involving the expenditure of Federal Aid Funds this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorable discharged soldiers, sailors, or marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States."

13.2 Successors and Assigns

In subparagraph 13.2.1, in the second sentence, delete “Except as provided in Subparagraph 13.2.2,“.

Delete subparagraph 13.2.2.

13.7 Time Limit on Claims

Delete paragraph 13.7 and substitute the following:

13.7 As between the Owner and Contractor as to acts or failures to act, any applicable statute of limitations shall commence to run and any legal cause of action shall be deemed to have accrued in any and all events in accordance with Idaho law.

Add to Article 13 the following:

13.8 Equal Opportunity

13.8.1 The Contractor shall maintain policies of employment as follows:

13.8.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, age or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

13.8.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitation or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, age or national origin.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 Termination by the Contractor
In subparagraph 14.1.1, in the first sentence, delete the number "30" and substitute the number "60".

Delete subparagraphs 14.1.1.3 and 14.1.1.4.

Delete subparagraph 14.1.2.

In subparagraph 14.1.3 delete "or 14.1.2".

In subparagraph 14.1.3 delete the words "costs incurred by reason of such termination, and damages."

Delete subparagraph 14.1.4.

14.2 Termination by the Owner for Cause

In subparagraph 14.2.2.3 delete the last sentence.

14.4 Termination by the Owner for Convenience

Delete subparagraph 14.4.3 and substitute the following:

14.4.3 In the case of such termination for the Owner convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Subparagraph 14.1.3, as modified.

ARTICLE 15 CLAIMS AND DISPUTES

15.1 Claims

Add to 15.1.4 the following:

15.1.4.1 The Contractor shall not be entitled to an adjustment in Contract Time or in Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by the Contractor or anyone for whose acts the Contractor is responsible. The Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor’s performance is delayed or changed due to the fault of the Owner. To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, the Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was concurrently caused, but shall not be entitled to an adjustment in Contract Sum. In the event that the Contractor is entitled to an adjustment in Contract Sum, the Owner will pay only for the following verifiable costs directly associated with the time extension or delay: 1) the actual labor costs, fringe benefits, employment taxes and insurance related to the Project Superintendent; 2) the cost associated with the fair rental value of the Project Superintendent’s vehicle directly related to the time extension; 3) the direct costs attributable to the extension for the field office facility, including telephone lines, utilities, power, lights, water, and sewer (toilets). Mark-up on these costs will not be allowed. The Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay regardless of cause.
15.4 Arbitration

Add the following sentences to the beginning of subparagraph 15.4.1:

“The Contractor and the Owner shall not be obligated to resolve any Claim or dispute related to this Contract by arbitration. Upon agreement of the parties and following the exhaustion of mediation, any Claim related to this Contract may be submitted to arbitration, either binding or non-binding, upon mutually agreeable terms and conditions. In the absence of such agreement, any reference in this Contract to arbitration is deemed void and has no force or effect.”

END OF SUPPLEMENTARY CONDITIONS
AGREEMENT BETWEEN OWNER AND CONTRACTOR

AIA Document A101, 2007 Edition, Standard Form of Agreement Between Owner and Contractor will be used as the agreement for this project. Copies of AIA Document A101 are available for review at the offices of the Owner and Architect. Copies of the document may be purchased from the American Institute of Architects or its local distributors.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 and 3.3 These dates will be fixed by issuance of a "Notice to Proceed". Delete the last sentence of paragraph 3.1.

3.3 Liquidated damages will be included as provided in the Supplementary Conditions.

ARTICLE 5 PAYMENTS

5.1.6 Retainage will be 5% for work completed and material suitably stored.

In subparagraph 5.1.6.1, delete the last sentence. Delete subparagraphs 5.1.7, 5.1.7.1, 5.1.7.2 and 5.1.8.

No reduction in retainage will be allowed prior to final completion without written approval of the Owner. Refer to Supplementary Conditions.

END OF AGREEMENT BETWEEN OWNER AND CONTRACTOR
CONTRACTOR’S AFFIDAVIT CONCERNING TAXES

STATE OF _____________________

COUNTY OF _____________________

Pursuant to the Idaho Code, Title 63, Chapter 15, I, the undersigned, being duly sworn, depose and certify that all taxes, excises and license fees due to the State or its taxing units, for which I or my property is liable then due or delinquent, has been paid, or arrangements have been made, before entering into a contract for construction of any public works in the State of Idaho.

________________________________________
Name of Contractor

________________________________________
Address

________________________________________
City and State

By: ____________________________________
(Signature)

Subscribed and sworn to before me this _________________ day of _________________, ______.

Commission expires: ______________________________

NOTARY PUBLIC, residing at

________________________________________

________________________________________
WEST ADA SCHOOL DISTRICT
APPLICATION AND CERTIFICATE FOR PAYMENT INSTRUCTIONS

Instructions To Contractors:
This is in Microsoft Excel 97 Format
Note: There are two pay application request "worksheets" on the disc. One - Partial Pay Request and Two - Final Pay Request

For Partial Pay Requests:
1. Suggested: Copy Partial Pay Request Worksheet
   a. Go to Edit, Move or Copy Sheet, Click Box Stating "Create a Copy" and then Click OK
   b. Rename new worksheet Partial Pay No. 1 (Go to Format, Sheet, Rename) The worksheet name will be shaded.
      Type new name of worksheet to Partial Pay No. 1.
2. All yellow shaded areas should be filled in with appropriate information. For items that do not apply, type or insert N/A in the cell. (A Sample Pay Request Is Included)
3. Fill in Original Contract Price, Additions to Date and Deductions to Date; (if there are none, leave blank) (Deductions should be entered as an entire number including decimal and cents - e.g. enter $300 as 300.00) This entry will automatically be deducted from Line 4 or Total Amount of Contract.
4. Go to Continuation Sheet (at bottom of worksheet). Fill in itemized Description of Work and Schedule of Values.
5. Enter percentage (%) complete for each item in Column % Completed. The Work Completed will automatically calculate and the figure will enter in Column E (This Period). All amounts should total at the bottom of the table. The Total Completed and Stored (Column G) will automatically enter on line 5 of Application and Certificate for Payment (top of the worksheet). Line 6 will automatically calculate. Note: Line 7 Total Amounts Paid to Date (or Requested to Date) must be filled in if there have been previous pay applications. Line 8 will automatically calculate partial payment amount requested.
6. Print out Pay Application
7. Sign and date application. Forward to appropriate architect or project manager if applicable.
8. Save your pay application on disc (Suggestion only)

For Partial Pay Applications (After First Initial Pay Request):
1. Copy previous partial pay application worksheet:
   a. Go to Edit
      1) Select "Move or Copy Sheet"
      2) Click "Create A Copy" and Then Click OK
2. On new pay app request, change necessary information: Application No.; Period From; Period To; and Application Date
3. Enter Additions to Date and/or Deductions to Date if applicable.
4. Enter on Line 7 (Total of Prior Amounts Paid) or (Requested) to Date; use the figure from Line 6 on the most recent or prior pay request.
5. Go to Continuation Sheet (bottom of worksheet). The amounts from Column G (Total Completed and Stored to Date) should be entered in Column D (Work Completed From Previous Application) and updated percentage (% Completed) entered. Balance of the calculations should be automatic.
6. Print out Pay Application
7. Sign and date application. Forward to appropriate architect or project manager if applicable.

For Final Pay Request
1. Copy all appropriate cell information from most recent partial pay request to Final Pay Request.
2. Enter Additions to Date and/or Deductions to Date if applicable.
3. Enter on Line 7 (Total of Prior Amounts Paid) or (Requested) to Date; use the figure from Line 6 on the most recent or prior pay request.
4. Go to Continuation Sheet (bottom of worksheet). The amounts from Column G (Total Completed and Stored to Date) should be entered in Column D (Work Completed From Previous Application) and updated percentage (% Completed) entered. (Do not copy and paste the figures). Balance of the calculations should be automatic.
5. Print out Pay Application
6. Sign and date application. Forward to appropriate architect or project manager if applicable.
TO (OWNER): West Ada School District #2
Facilities Department
2301 E. Lanark
Meridian, ID 83642

FROM CONTRACTOR:

PROJECT: APPLICATION NO: ARCHITECTS PURCHASE ORDER NO:

3. Total Amount of Contract to Date (Line 1 + 2 + 3 on this form) .........................................................

6. If Payment Request Is For Partial Payment, Multiply Line 5 x 95%
And Enter Here (If Final Payment, Leave Blank) ..........................

7. Total of Prior Amounts Paid To Date (Line 6 From Prior Certificate).

8. If Request Is For Partial Payment, Subtract Amount Shown On
Line 7 From Amount On Line 6 (If For Final Payment, Leave Blank) ....

9. If Request Is Final and/or Full Payment, USE FINAL PAY REQUEST

This certifies that to the best of our knowledge, information, and belief based on
what our observations have revealed, the quantity of work is as indicated in the Contractor's Application for Payment
above and the quality of same is in general accordance with the Contract Documents.

We recommend that payment be made to the Contractor in the Net Amount as
shown due above:

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Architect

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Project Manager

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Spencer McLean

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Administrator of Buildings & Grounds

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Spencer McLean

This certifies that to the best of our knowledge, information, and belief based on
what our observations have revealed, the quantity of work is as indicated in the Contractor's Application for Payment
above and the quality of same is in general accordance with the

Contract Documents, that all lawful charges for labor, materials, etc.,
covered by previous applications have been paid and that the amount
due under this application for payment is as indicated.

Submitted by:

Contractor

(S E A L)

BY: ___________________________ ___________________________ DATE:

This certifies that to the best of our knowledge, information, and belief based on
what our observations have revealed, the quantity of work is as indicated in the Contractor's Application for Payment
above and the quality of same is in general accordance with the

Contract Documents.

We recommend that payment be made to the Contractor in the Net Amount as
shown due above:

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Architect

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Project Manager

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Spencer McLean

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Administrator of Buildings & Grounds

Approved: ___________________________ ___________________________ Date

By: ____________________________________________

Spencer McLean
Application and Certificate for Payment is attached. In tabulations below, amounts are stated to the nearest cent. Use Column 1 on Contracts where variable retainage for line items may apply.

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<th>ITEM NO.</th>
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<th>THIS PERIOD</th>
<th>TOTAL COMPLETED AND STORED TO DATE (D+E)</th>
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<th>BALANCE TO FINISH (C-G)</th>
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**TOTALS**: 0.00 0.00 0.00 0.00 0.00 0.00
**APPLICATION AND CERTIFICATE FOR PAYMENT (FINAL PAYMENT)**

**TO (OWNER):**

West Ada School District #2
Facilities Department
2301 E. Lanark
Meridian, ID 83642

**FROM CONTRACTOR:**

ARCHITECTS PURCHASE ORDER NO.: PROJECT NO:

**APPLICATION NO:** FINAL

**VIA (ARCHITECT):**

**PERIOD FROM:**

**PERIOD TO:**

**DISTRIBUTION TO:**

- [ ] ACCOUNTING OFFICE
- [ ] FACILITIES OFFICE
- [ ] ARCHITECT
- [ ] CONTRACTOR

**CONTRACT FOR:**

- [ ] 1. Original Contract Price
- [ ] 2. Additions To Date
- [ ] 3. Deductions To Date
- [ ] 4. Total Amount of Contract to Date (Line 1 + 2 + 3 on this form)
- [ ] 5. Total Value of Work Performed & Materials On Site To Date (Column G)
- [ ] 6. (FOR FINAL PAYMENT, LEAVE LINE BLANK)
- [ ] 7. Total of Prior Amounts Paid To Date (Line 6 From Prior Certificate)
- [ ] 8. (FOR FINAL PAYMENT, LEAVE LINE BLANK)
- [ ] 9. If Request Is Final and/or Full Payment, Subtract Amount Shown On Line 7 From Amount Shown On Line 5 & Enter Here

**CERTIFICATE OF PAYMENT**

This certifies that to the best of our knowledge, information, and belief based on what our observations have revealed, the quantity of work is as indicated in the contractor's Application for Payment above and the quality of same is in general accordance with the Contract Documents, that all lawful charges for labor, materials, etc., covered by previous applications have been paid and that the amount due under this application for payment is as indicated.

Approved:

Submitted by:

This certifies that to the best of our knowledge, information, and belief based on what our observations have revealed, the quantity of work is as indicated in the contractor's Application for Payment above and the quality of same is in general accordance with the Contract Documents, that all lawful charges for labor, materials, etc., covered by previous applications have been paid and that the amount due under this application for payment is as indicated.

Approved:

Submitted by:

**DATE:**

**BY:**

Contractor

(S E A L)

**DATE:**

**BY:**

**DATE:**

Architect

**DATE:**

**BY:**

**DATE:**

Project Manager

**DATE:**

**BY:**

**DATE:**

Administrator of Buildings & Grounds

**DATE:**

**BY:**

**DATE:**

Approved:

**DATE:**

**BY:**

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**BY:**

**DATE:**
Application and Certificate for Payment is attached. In tabulations below, amounts are stated to the nearest cent. Use Column 1 on Contracts where variable retainage for line items may apply.

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| TOTALS   | 0.00                | 0.00            | 0.00                            | 0.00                                     | 0.00              | 0.00                    |
PART 1 - GENERAL

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

1.2. DESCRIPTION OF THE PROJECT
   A. The scope of this project, located at the existing West Ada District Facility includes the remodel of approximately 4,826 square feet of existing office space. Scope of work shall include new partition walls, interior hollow metal framed entrances and window frames, interior finishes, fixtures, and mechanical, HVAC, plumbing, electrical, fire alarm modification, the General Contractor will be required to provide the installation of new carpet tile as designated on the documents, however the carpet tile will be provided by the Owner and all as required by, specified in, and shown on the Contract Documents.

1.3. CONTRACT DOCUMENTS
   A. The Contract Documents for the Work are entitled:
      
      West Ada School District Office
      I.T. Department Office Remodel
      Meridian, Idaho
   
   

1.4. TYPE OF CONTRACT
   A. Project will be constructed with a single contract.

1.5. WORK PHASES
   A. The Work shall be conducted in a single phase.

1.6. USE OF PREMISES
   A. General: Contractor shall have use of premises only as required for construction operations. Contractor’s use of premises is also limited by Owner’s right and intention to self- perform work or to retain other contractors for portions of the project.
B. Contractor shall maintain roads and streets surrounding the project site in an accessible and clean condition throughout the construction period.

1. Roads and streets surrounding the project site shall not be blocked to vehicle traffic at any time by operations under this Contract, except as is necessary to support construction operations.
2. Contractor and construction personnel shall not park equipment or personal vehicles along roads and streets surrounding the project site, nor in a manner to disrupt traffic flow or access to any adjacent properties.
3. Contractor shall not enter adjacent properties, private driveways, etc., for any reason. Do not use adjacent properties or private driveways for vehicle turn around.
4. Contractor shall not drive on, park on, or store equipment or materials on properties adjacent to the site without the express written permission of the owner of such properties. Materials stored on adjacent properties shall not be considered as “stored on site” for determining amounts of payments owed to Contractor.

1.7. OWNER’S OCCUPANCY REQUIREMENTS

A. Owner Occupancy: Owner will occupy the building and site areas adjacent to the construction area during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner’s day-to-day operations.

1. Provide not less than 72 hours notice to Owner of activities that will affect Owner’s operations.

1.8. WORK RESTRICTIONS

A. On-Site Work Days and Hours: Work days and hours are not restricted, except as required to comply with local ordinances and regulations.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than seven days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Owner’s written permission.
3. The Contractor shall make every effort to minimize the time that building services and equipment operation is interrupted by Work under this Contract.

1.9. SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC’s "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are
not used. Consult the table of contents at the beginning of the Project Manual to
determine numbers and names of Sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in
the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and
the intended meaning of certain terms, words, and phrases when used in particular situations.
These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract
Documents is abbreviated. Words and meanings shall be interpreted as appropriate.
Words implied, but not stated, shall be inferred, as the sense requires. Singular words
shall be interpreted as plural, and plural words shall be interpreted as singular where
applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications.
Requirements expressed in the imperative mood are to be performed by Contractor.
Occasionally, the indicative or subjunctive mood may be used in the Section Text for
clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by
others when so noted.

   a. The words "shall," "shall be," or "shall comply with," depending on the context,
      are implied where a colon (:) is used within a sentence or phrase.

1.10. FIRE RATED ASSEMBLIES

A. Fire rated construction shall conform to any requirements of fire rated assemblies referenced on
the Drawings or described in the Specifications.

   1. The Contractor shall provide all components necessary to conform to any and all
      referenced assemblies.

1.11. OWNERSHIP OF REMOVALS

A. The Contractor shall be responsible for any and all demolition and removal as may be
necessary and required to fulfill the requirements of the Contract Documents.

B. All removals shall belong to the Contractor and shall be removed from the premises by him and
legally disposed of at his expense.

1.12. WORK NOT NOTED, DETAILED, OR SPECIFIED

A. All work required for a complete installation or assembly shall be included in the Contractor's
bid. Where minor portions of required work are not noted, detailed or specified, such work
shall be done in accordance with proven construction practice, industry standards, or as directed
by Architect. Such required work shall be done at no additional cost to Owner.
1.13. DIMENSIONS AND MEASUREMENTS

A. Contractor shall field verify all dimensions pertaining to the work and shall be responsible for the determination of all quantities of materials required for the work and for the accuracy of all dimensions of materials and items fabricated for this project. Contractor shall not rely on the scale drawings in the project Drawings in the determination of exact quantities or dimensions.

1.14. GENERAL INSTALLATION PROVISIONS

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

B. Manufacturer's Instructions. Contractor shall comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Contractor shall inspect materials or equipment immediately upon delivery and prior to installation and shall reject damaged and defective items.

D. Contractor shall provide all attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Contractor shall provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to Architect for final decision.

F. Contractor shall check and recheck measurements, dimensions, and elevations before starting each installation and shall be responsible for the accuracy of all measurements, dimensions, and elevations.

G. Contractor shall install each component during acceptable weather conditions.

I. Blocking and Backing: Contractor shall provide blocking and backing for all items for which blocking and backing is required. Verify blocking and backing requirements and provide such blocking and backing at no additional cost to the Owner, whether or not such items are indicated on the Drawings.

1.15. CLEANING AND PROTECTION

A. During handling and installation, The Contractor shall clean and protect construction in progress, adjoining materials in place, and existing construction. Apply protective coverings where required to ensure protection from damage or deterioration at Substantial Completion.
B. Limiting Exposures: The Contractor shall supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure from any source during the construction period. Roof shall be rendered completely watertight at the conclusion of each day’s work.

1.16. REQUIREMENTS OF DRAWINGS AND SPECIFICATIONS

A. All items of Work shown or noted on the Drawings and / or described in the Project Manual shall be provided by the Contractor as a part of his Work. Should an item be shown or noted on the Drawings and not described in the Project Manual, the Contractor shall provide the item at no additional cost to the Owner. Should an item be described in the Project Manual and not shown or noted on the Drawings, the Contractor shall provide the item at no additional cost to the Owner.

END OF SECTION 011000
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PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section specifies administrative and procedural requirements for handling and processing
   Contract modifications.

1.3 MINOR CHANGES IN THE WORK
   A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not
   involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710,
   "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS
   A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed
   changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If
   necessary, the description will include supplemental or revised Drawings and Specifications.
   
   1. Proposal Requests issued by Architect are for information only. Do not consider them
   instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a
   quotation estimating cost adjustments to the Contract Sum and the Contract Time
   necessary to execute the change.
   
   a. Include a list of quantities of products required or eliminated and unit costs, with
   total amount of purchases and credits to be made. If requested, furnish survey data
   to substantiate quantities.
   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade
   discounts.
   c. Include costs of labor and supervision directly attributable to the change.
   d. Include an updated Contractor's Construction Schedule that indicates the effect of
   the change, including, but not limited to, changes in activity duration, start and
   finish times, and activity relationship. Use available total float before requesting
   an extension of the Contract Time.
   
   B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the
   Contract, Contractor may propose changes by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.


1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form provided by Owner.

1.6 CONSTRUCTION CHANGE DIRECTIVE


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

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

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and
   process Applications for Payment.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract
   Sum to various portions of the Work and used as the basis for reviewing Contractor's
   Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of
   Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms
      and schedules, including the following:
      a. Application for Payment forms with Continuation Sheets.
      b. Submittals Schedule.
      c. Contractor's Construction Schedule.
   2. Submit the Schedule of Values to Architect at earliest possible date but no later than
      seven days before the date scheduled for submittal of initial Application for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items
   for the Schedule of Values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's project number.
      d. Contractor's name and address.
      e. Date of submittal.
2. Submit draft of AIA Document G703 Continuation Sheets or other equivalent form approved by Architect and Owner.

3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Change Orders (numbers) that affect value.
      1) Change Orders shall be fully executed with all necessary signatures before they are included in the Schedule of Values.
      2) Construction Change Directive cost changes shall be incorporated into fully executed Change Order(s) before they are included in the Schedule of Values.
   d. Dollar value.
      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Provide a separate line item for the value of project closeout activities.

9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

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

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress payments shall be submitted to Architect on or before the agreed date of each month. The period covered by each Application for Payment is one month, ending on the last day of the month.

C. Payment Application Forms: Use AIA Document G702 or other equivalent form approved by Owner and Architect.
   1. Entries on continuation sheet shall be consistent with approved Schedule of Values.

D. Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incorrect or incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders issued before last day of construction period covered by application.

E. Transmittal: Submit one signed original copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of Values.
   3. Contractor's Construction Schedule (preliminary if not final).
   4. Products list.
   5. Submittals Schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.

G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete, less the value of project closeout activities.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following on forms acceptable to Owner.
1. Evidence of completion of Project closeout requirements.
2. Contractor's Affidavit of Payment of Debts and Claims.
4. Consent of Surety to Final Payment.
5. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination.
2. Administrative and supervisory personnel.
3. Project meetings.
4. Requests for Interpretation (RFIs).

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

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

1.5 SUBMITTALS

A. Key Personnel Names: Prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

A. General: Meetings and conferences will be held at Project site, unless otherwise indicated.

B. Preconstruction Conference: Contractor will schedule a preconstruction conference before the start of construction, at a time convenient to all parties. The conference will be held at Project site or another convenient location. Contractor will conduct the meeting.

1. Attendees: Authorized representatives of Owner; Architect, Architect’s consultants; Contractor; Contractor’s superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress.
3. Minutes: Contractor will record and distribute meeting minutes.
C. Progress Meetings: Contractor will conduct progress meetings at two week intervals. Dates of meetings will be coordinated with preparation of payment requests on a monthly basis.

1. Attendees: In addition to representatives of Owner, Architect, Architect’s consultants, Contractor, and Contractor’s superintendent, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

      1) Review schedule for next period.

   b. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

   c. Review present and future needs of each entity present.

3. Minutes: Contractor will record and distribute the meeting minutes.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit an RFI on a form acceptable to Owner and Architect.

   1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.

   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

   1. Project name.

   2. Date.

   3. Name of Contractor.


   5. RFI number, numbered sequentially.

   6. Specification Section number and title and related paragraphs, as appropriate.

   7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
   a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, and details of affected materials, assemblies, and attachments.

C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow ten working days for Architect's response for each RFI. RFIs received after 3:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Architect's actions on submittals.
   f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 SUBMITTAL PROCEDURES
   A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
      1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
      2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
         a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
   B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
      1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
      2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
      3. Resubmittal Review: Allow 15 days for review of each resubmittal.
      4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 20 days for initial review of each submittal.
   C. Identification: Place a permanent label or title block on each submittal for identification.
      1. Indicate name of firm or entity that prepared each submittal on label or title block.
      2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Contractor.
   d. Name and address of subcontractor.
   e. Name and address of supplier.
   f. Name of manufacturer.
   g. Submittal number or other unique identifier, including revision identifier.

   1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

   h. Number and title of appropriate Specification Section.
   i. Drawing number and detail references, as appropriate.
   j. Location(s) where product is to be installed, as appropriate.
   k. Other necessary identification.

D. Deviations: Highlight, Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.

E. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

   1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

   1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
I. Use for Construction: Use only final submittals with mark indicating final unrestricted release or final but restricted release action taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operation and maintenance manuals.
   k. Compliance with specified referenced standards.
   l. Testing by recognized testing agency.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit eight copies of Product Data, unless otherwise indicated. Architect will return six copies. Mark up and retain one returned copy as a Project Record Document. Electronic PDF files are acceptable in lieu of hard copies. Provide two “Final Approved” hard copies for inclusion in the Operation and Maintenance manuals.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).

3. Number of Copies: Submit eight opaque copies of each submittal. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing. Electronic PDF files are acceptable in lieu of hard copies. Provide two “Final Approved” hard copies for inclusion in the Operation and Maintenance manuals.

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
   
a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   
a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   
a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from
manufacturer's product line. Architect will return one set of samples with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit samples that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

   1. Type of product. Include unique identifier for each product.
   2. Number and name of room or space.
   3. Location within room or space.
   4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

   a. Mark up and retain one returned copy as a Project Record Document.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation".

G. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit three copies of subcontractor list.
5. Subcontractor list shall be included in Project Record Documents.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
   2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a
product or equipment. Include name of product and name, address, and telephone number of manufacturer.

T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections.

U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit eight copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 ARCHITECT'S / ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return copies. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Final Unrestricted Release: Where submittals are marked “Approved,” that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
2. Final-But-Restricted Release: When submittals are marked “Approved as Noted,” that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Re-submittal: When submittal is marked “Not Approved, Revise and Resubmit” do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered no responsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale’s "Encyclopedia of Associations" or in Columbia Books’ "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200
PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES
A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum.

B. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1. Contractor shall supplement existing building electrical system with portable generators as required to pursue the Work if necessary. Such generators and fuel shall be provided at no additional cost to Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work. Locate where approved by Owner.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
3.2 TEMPORARY UTILITY INSTALLATION

A. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. Refer to Paragraph 1.3.B. above.

B. Sanitary Facilities: Use of Owner’s existing restroom facilities will be permitted. Owner to designate which restroom may be utilized by construction personnel.

C. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner. Refer to Paragraph 1.3.C. above.

D. Telephone Service: Provide temporary telephone service. Cellular telephone service is acceptable.

3.3 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting. Install 3 foot high orange plastic safety barrier fencing around construction site following alignment of permanent, Owner installed chain link fencing.

C. Temporary Protectives: Provide temporary Protective measures for protection of construction, existing, in progress and completed, from exposure, water from any source, foul weather, other construction operations, and similar activities.

D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

   1. Smoking on school district property is not permitted.
2. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Termination and Removal: Remove each temporary facility when need for its service has ended or no later than Substantial Completion.

1. Materials and facilities that constitute temporary facilities are property of Contractor.

END OF SECTION 015000
SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

1.3 DEFINITIONS
   A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

   3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

   B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics.

1.4 SUBMITTALS
   A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 10 calendar days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 10 calendar days of receipt of additional information or documentation, whichever is later.

   a. Form of Acceptance: Change Order.
   b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. Contractor is responsible for providing products and construction methods compatible with products and construction methods.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," obtain Architect’s approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed.
7. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system.

8. **Basis-of-Design Product:** Where Specifications name a product, provide the specified product. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Products by other manufacturers are subject to approval prior to bidding.

9. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

   a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.

   b. **Full Range:** Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 **PRODUCT SUBSTITUTIONS**

A. **Product Substitutions:** Following award of Contract, Architect will consider requests for substitution for products specified, or approved by addendum, under any or all of the following conditions:

1. The specified product cannot be provided within the Contract Time. The request will not be considered if the product cannot be provided as a result of the Contractor’s failure to pursue the Work promptly or coordinate activities properly.

2. The specified product cannot receive necessary approvals by governing authorities, and the requested substitution can be approved.

3. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

4. The specified product cannot be provided in a manner that is compatible with other materials, or cannot be properly coordinated, warranted, or insured, and where the Contractor certifies that he substitution will overcome the deficiency.
B. By making a request for substitution, contractor warrants that:

1. Requested substitution does not require extensive revisions to the Contract Documents.
2. Requested substitution is consistent with the Contract Documents and will produce indicated results.
3. Substitution request is fully documented and properly submitted.
4. Requested substitution will not adversely affect Contractor's Construction Schedule.
5. Requested substitution has received necessary approvals of authorities having jurisdiction.
6. Requested substitution is compatible with other portions of the Work.
7. Requested substitution has been coordinated with other portions of the Work.
8. Requested substitution provides specified warranty.
9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000
SECTION 017300 - EXECUTION

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes general procedural requirements governing execution of the Work
      including, but not limited to, the following:
      2. General installation of products.
      3. Progress cleaning.
      4. Protection of installed construction.
      5. Correction of the Work.

1.3 SUBMITTALS
   A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept
      hazardous materials, for hazardous waste disposal, if any.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Existing Conditions: The existence and location of construction indicated as existing are not
      guaranteed. Before beginning work, investigate and verify the existing construction and
      location of existing mechanical and electrical systems affecting the Work.
   
   B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or
      Applicator present where indicated, for compliance with requirements for installation tolerances
      and other conditions affecting performance. Record observations.
      1. Written Report: Where a written report listing conditions detrimental to performance of
         the Work is required by other Sections, include the following:
a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.


3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished area, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated or as indicated on Drawings or as specified, whichever is the more stringent requirement.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Allow for building movement, including thermal expansion and contraction.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site shall not be permitted. Washing waste materials down sewers or into waterways shall not be permitted.
H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

3.6 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 017300
SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

3. Products: List products to be used and firms or entities that will perform the Work.

4. Dates: Indicate when cutting and patching will be performed.

5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.
1.5 QUALITY ASSURANCE

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

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

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

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

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties, if any.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

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

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

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Proceed with patching after construction operations requiring cutting are complete.
C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
   c. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Prepare and submit Project Record Documents, operation and maintenance manuals, damage and similar final record information.
3. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
4. Complete startup testing of systems.
5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
6. Complete final cleaning requirements, including touchup painting.
7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.
1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list). The copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
4. Submit all required warranties.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction or documents that must be completed, corrected or submitted before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Remove tools, construction equipment, machinery, and surplus material from Project site.
c. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
d. Remove debris and surface dust from limited access spaces.
e. Clean transparent materials, including glass in doors and windows.
f. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
g. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700
SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes administrative and procedural requirements for preparing operation and
      maintenance manuals, including the following:
      1. Maintenance manuals for the care and maintenance of products, materials, and finishes.

1.3 SUBMITTALS
   A. Submittal: Submit 3 copies of manual at least 3 calendar days before requesting inspection for
      Substantial Completion.
      1. Correct or modify each manual to comply with Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL
   A. Organization: Organize manual into a separate section for each material or assembly.
   B. Manual Contents: Assemble maintenance instructions for materials or assemblies into a single
      binder.
      1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to
         accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with
         clear plastic sleeve on spine to hold label describing contents and with pockets inside
         covers to hold folded oversize sheets.
         a. Identify each binder on front and spine, with project title or name, and subject
            matter of contents.
      2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each
         tab to indicate contents. Include typed list of products and major components of
         equipment included in the section on each divider, cross-referenced to Specification
         Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 PRODUCT AND ASSEMBLY MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.
PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

D. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823
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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
a. Give particular attention to information on concealed elements that would be
difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup
before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Actual equipment locations.
   d. Locations of concealed internal utilities.
   e. Changes made by Change Order or Construction Change Directive.
   f. Changes made following Architect's written orders.
   g. Details not on the original Contract Drawings.
   h. Field records for variable and concealed conditions.
   i. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing
actual physical conditions, completely and accurately. If Shop Drawings are marked,
show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish
between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted
from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order
numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD
DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into
manageable sets. Bind each set with durable paper cover sheets. Include identification
on cover sheets.
2. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation
varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that
cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA
A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS
A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE
A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
B. Maintenance of Record Documents and Samples: Store Record Documents and Samples apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839
SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

1.3 DEFINITIONS
A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP
A. Unless otherwise indicated, demolition waste becomes property of Contractor.
B. As determined by the Owner, specific doors and door hardware will remain the property of the Owner.

1.5 PREINSTALLATION MEETINGS
A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.

2. Coordination for shutoff, capping, and continuation of utility services, if any.

3. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes, if any, by a landfill facility licensed to accept hazardous wastes.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify the Construction Manager “space”, Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.
F. Utility Service: Maintain existing utilities in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review any available record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
   2. Owner will arrange to shut off indicated services/systems when requested by Contractor.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches.
5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
6. Remove elevated items and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:
1. Clean salvaged items.
2. Store items in a secure area until delivery to Owner.
3. Transport items to Owner's storage area on-site.
4. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Protect items from damage during transport and storage.
   3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

E. Patching and Finishing of Materials: All required routing, extension, and/or connection of new piping, conduit, wiring, and/or similar construction in existing walls, ceilings, and floors that requires “opening” and/or cutting, and/or core drilling of existing materials shall require the Contractor to patch the specific existing materials involved per industry standards in an acceptable finished solution. Contractor shall employ workmen skilled and experienced in the specific types of work involved to perform patching. The Contractor shall field verify all existing conditions and provide all required work at no additional cost to the owner.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.
   1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent surfaces, structures, and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119
SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes the following:
      1. Plastic-laminate cabinets.
      2. Plastic-laminate countertops.

1.3 DEFINITIONS
   A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for
      installing woodwork items unless concealed within other construction before woodwork
      installation.

1.4 SUBMITTALS
   A. Product Data: For panel products, high-pressure decorative laminate, adhesive for bonding
      plastic laminate, solid-surfacing material, and cabinet hardware and accessories.
   B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale
      details, attachment devices, and other components.
      1. Show fabrication and attachment details in large scale, section views.
      2. Show locations and sizes of furring, blocking, and hanging strips, including concealed
         blocking and reinforcement specified in other Sections.
      3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other
         items installed in architectural woodwork.
   C. Samples for Selection:
      1. Plastic laminates.
      2. PVC edge material.
      3. Thermoset decorative panels.
1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Skilled finish carpenters specializing in installation of cabinets and pre-manufactured millwork with minimum three years installation experience.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

   1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

C. Thermoset Decorative Panels: Particleboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
   1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
   1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
      a. Formica Corporation.
      b. Nevamar Company, LLC; Decorative Products Div.
      c. Panolam Industries International Incorporated.
      d. Wilsonart International; Div. of Premark International, Inc.
   2. Products by other manufacturers are subject to Architect’s approval prior to bidding.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
   1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
   2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
   3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:

2. Interior Type A: Low-hygroscopic formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
4. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
5. Kiln-dry materials before and after treatment to levels required for untreated materials.

C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

1. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2070 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 and 225 lbf (1100 and 1000 N), respectively.
2. For panels 13/16 to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi (9 MPa); modulus of elasticity, 250,000 psi (1720 MPa); linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf (1100 and 780 N), respectively.
3. Product: Subject to compliance with requirements, provide "Duraflake FR" by Weyerhaeuser.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 120 degrees of opening.

C. Wire Pulls: Back mounted, solid metal 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141. Magnetic catches are not required with self closing hinges.

E. Shelf Rests: BHMA A156.9, B04013; metal (nickel plated), one-pin type with vertical spiked anti-slide feature. Hafele 282.24.720 or equivalent.

F. Drawer Slides: BHMA A156.9, B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

G. Door Locks: BHMA A156.11, E07121. All locks within a given room shall be keyed alike. Locks in different rooms shall be keyed differently.

H. Drawer Locks: BHMA A156.11, E07041. All locks within a given room shall be keyed alike. Locks in different rooms shall be keyed differently.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Stainless Steel: BHMA 630.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
   1. US26D Dull Chrome.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content, treated per American Wood Preservers Association (AWPA) AWPA C20.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Wood Glues: 30 g/L.
   2. Contact Adhesive: 250 g/L.

E. Adhesive for Bonding Plastic Laminate: Contact cement.

   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. 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.
C. Fabricate woodwork to dimensions, profiles, and details indicated.

D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.6 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. AWS Type of Cabinet Construction: Flush Overlay.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Vertical Surfaces: Grade HGS.
3. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.

D. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
   a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
   b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS. See Drawings for locations of thermoset decorative (melamine) surfacing at cabinet interiors.

2. Drawer Sides and Backs: Thermoset decorative panels.
3. Drawer Bottoms: Thermoset decorative panels.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL. See Drawings for locations of thermoset decorative (melamine) surfacing at cabinet interiors.
F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range of colors and patterns and as follows:
   a. Wood grains with matte finish and grain direction vertical on all vertical cabinet surfaces.
   b. Solid colors, gloss or matte finish.
   c. Patterns, gloss or matte finish.

G. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located under tops.

2.7 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Custom.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in one or both of the following categories:
   a. Solid colors with core same color as surface, matte finish.
   b. Non-wood grain patterns, matte finish.
   c. Wood grains, gloss or matte finish.
   d. Patterns, gloss or matte finish.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces at vertical splashes and self edges.

E. Core Material: Particleboard made with water resistant exterior glue.

F. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

2.8 UTILITY SHELVING, OPEN AND WITHIN CABINETS

A. Grade: Custom.

B. Shelf Material: 3/4-inch (19-mm) thermoset decorative panel with PVC or polyester edge banding.
PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

F. Anchor cabinetry to anchors or blocking built in or directly attached to substrates. Secure floor mounted cabinets and shelving to walls with countersunk, capped screws and/or blind nailing at 32 inches o.c. into wood framing or blocking as required for complete installation. Secure wall hung closed cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish. Secure wall hung open cabinets and shelving with countersunk, capped screws at top and bottom at no less than 12 inches o.c.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variations from a straight line.

H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.

3. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.

4. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

I. Touch up finishing work specified in this Section after installation of woodwork. Fill screw holes with matching filler where exposed.

3.3 INSTALLATION OF SINKS

A. Comply with installation requirements in SEFA 2.3.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023
SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes the following:
   1. Sound attenuation insulation.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE
A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
B. Protect plastic insulation as follows:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

B. Products by other manufacturers are subject to approval by the Architect prior to bidding.

2.2 GLASS-FIBER ACOUSTIC BLANKET INSULATION

A. Basis of Design:

1. Owens Corning, Quiet Zone Acoustic Batts.

B. Manufacturers:

1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
4. Knauf Fiber Glass.
5. Owens Corning.

C. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

D. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:

1. 3-1/2 inches (89 mm) thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
2. 5 ½ inches (140mm) thick with a thermal resistance of 19 deg F x h x sq. ft./BTU at 75 deg F (3.3K x sq. m/w at 24 deg C).
2.3 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Products:
   a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
   b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
   c. Gemco; Spindle Type.

2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.

3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Products:
   a. AGM Industries, Inc.; RC150.
   b. AGM Industries, Inc.; SC150.
   c. Gemco; Dome-Cap.
   d. Gemco; R-150.
   e. Gemco; S-150.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

   a. Where indicated.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products:
   a. AGM Industries, Inc.; TACTOO Adhesive.
   b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
   c. Gemco; Tuff Bond Hanger Adhesive.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL
A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
B. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
C. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
D. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION
A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures.
4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically.

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Install 6-inch nominal thick, unfaced glass fiber blanket insulation as and where indicated on the Drawings.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100
SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes joint sealants for applications indicated on the Drawings that are not specifically included under any other specifications section.

1.3 PERFORMANCE REQUIREMENTS

A. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

B. Products by other manufacturers are subject to Architect’s approval prior to bidding.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Single-Component Neutral-Curing Silicone Sealant: Use this sealant for joints subject to movement at interior and exterior locations for metals, glass, and ceramic type materials

   1. Products:
      a. Dow Corning Corporation; 790.
      b. Tremco; Spectrem 1
      c. GE Silicones; SilPruf SCS2000.
      d. Pecora Corporation; 864.

E. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant: Use this sealant for joints in toilet rooms and interior wet areas.

   1. Products:
a. Dow Corning Corporation; 786 Mildew Resistant.
b. GE Silicones; Sanitary SCS1700.
c. Tremco; Tremsil 200.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF. Use this sealant for general interior caulking and at drywall and wood construction to be painted.

B. Products:
1. Pecora Corporation; AC-20+.
2. Sonneborn, Division of ChemRex Inc.; Sonolac.
3. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Products:
   a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by
cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200
SECTION 081113 - HOLLOW METAL FRAMES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Standard hollow metal door, transom, sidelite, borrow lite, and glazing frames.

1.3 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings.
   B. SDI Designations: Reference to Steel Door Institute (SDI).
   C. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS
   A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
   B. Shop Drawings: Include the following:
      1. Elevations of each door design.
      2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
      3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
      4. Locations of reinforcement and preparations for hardware.
      5. Details of each different wall opening condition.
      6. Details of anchorages, joints, field splices, and connections.
      7. Details of accessories.
      8. Details of moldings, removable stops, and glazing.
      9. Details of conduit and preparations for power, signal, and control systems, if any.
   C. Other Action Submittals:
      1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
D. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

C. All fire rated frames shall be tested and labeled in conformance to the requirements of Section 716 of the International Building Code, 2012 Edition.

D. Provide frames complying with Steel Door Institute “Recommended Specifications Standard Steel Doors and Frames”, ANSI/SDI-100, and doors and frames that meet or exceed Hollow Metal Manufacturers Association (HMMA) manufacturing tolerances and that meet or exceed HMMA installation tolerances.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Fleming Door Products Ltd.; an Assa Abloy Group company.
5. Kewanee Corporation (The).
6. Mesker Door Inc.
7. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
H. 
Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. 
Glazing: Comply with requirements in Division 08 Section "Glazing."

J. 
Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Interior Frames: Fabricated from cold-rolled steel sheet.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as face welded unless otherwise indicated.
   3. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
   4. Frames for Wood Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
   5. Frames for Borrowed Lights: 0.053-inch- (1.3-mm-) thick steel sheet.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.4 FRAME ANCHORS

A. Jamb Anchors:
   1. Steel Stud Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.
C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.6 ACCESSORIES
A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.7 FABRICATION
A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Welded Frames: Weld joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
   2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
   3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
   5. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
         1) Three anchors per jamb up to 60 inches (1524 mm) high.
         2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
         3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
   6. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections, if any, with Division 26 Sections.

F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-protection-rated openings, install frames according to National Fire Protection Association (NFPA) NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable glazing stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that are filled with grout.
2. **Floor Anchors:** Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   
   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. **Stud Partitions:** Solidly pack mineral-fiber insulation behind frames.

4. **Installation Tolerances:** Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   
   a. **Squareness:** Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   
   b. **Alignment:** Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
   
   c. **Twist:** Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   
   d. **Plumbness:** Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. **Glazing:** Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

### 3.4 ADJUSTING AND CLEANING

A. **Final Adjustments:** Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. **Prime-Coat Touchup:** Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. **Metallic-Coated Surfaces:** Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113
SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge
construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door;
construction details not covered in Product Data; location and extent of hardware blocking; and
other pertinent data.

C. Samples for Selection: For factory-finished doors.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A,
"Architectural Wood Flush Doors."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.
1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
   b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.


PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Eggers.
2. Graham.
3. Oshkosh.
4. Marshfield.
5. VT Industries.
6. Weyerhaeuser.

B. Doors by other manufacturers are subject to approval by the Architect.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Window & Door Manufacturers Association (WDMA) WDMA I.S.1-A Performance Grade: Extra Heavy Duty

C. Particleboard-Core Doors:
1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde resin.
2. Blocking: Provide wood blocking in particleboard-core doors as follows:
   a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
   b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
   c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NPFA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
5. Pairs: Provide formed-steel edges and astragals with intumescent seals.
   a. Finish steel edges and astragals with baked enamel same color as doors.
   b. Finish steel edges and astragals to match door hardware (locksets or exit devices).

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Select White Birch. No heartwood showing, 1/50 inch minimum thickness.
3. Cut: Plain sliced.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical Edges: Same species as faces or a compatible species.
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty
2.4 LOUVERS AND LIGHT FRAMES

A. Metal Frames for Light Openings in Doors: Manufacturer's standard frame formed of 0.048-inch-(1.2-mm-) thick, cold-rolled steel sheet; pre-finished. Color as selected by Architect.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with Door Hardware Institute (DHI) DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA TR-4 conversion varnish or TR-6 catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range of colors. Match existing wood door stain color.
4. Effect: Filled finish.
5. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors, if any, in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

   a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416
SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.
3. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

5. NFPA 105 - Installation of Smoke Door Assemblies.
6. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies
1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

   3. Content: Include the following information:

      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.
      g. Door and frame sizes and materials.

   4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
2. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

D. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

3. NFPA 101: Comply with the following for means of egress doors:
   a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Thresholds: Not more than 1/2 inch high.

4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
   a. Test Pressure: Positive pressure labeling.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.
H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, arrange for manufacturers' representatives to hold a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures.

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.
1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for exit hardware.
5. Twenty five years for manual surface door closers.
6. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

   a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

   a. Two Hinges: For doors with heights up to 60 inches.

   b. Three Hinges: For doors with heights 61 to 90 inches.

   c. Four Hinges: For doors with heights 91 to 120 inches.

   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.

   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.

   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

      1) Out-swinging exterior doors.
      2) Out-swinging access controlled doors.
3) Out-swinging lockable doors.

5. Acceptable Manufacturers:
   a. Hager Companies (HA).
   b. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.

   1. Acceptable Manufacturers:
      a. McKinney Products (MK).
      b. Pemko Manufacturing (PE).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

   1. Acceptable Manufacturers:
      a. Rockwood Manufacturing (RO).
      b. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

   1. Push/Pull Plates: Minimum .050 inch thick, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
   2. Straight Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door unless otherwise indicated.
   3. Offset Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees unless otherwise indicated.
   4. Push Bars: Minimum 1-inch round diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door unless otherwise indicated.
   5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
a. Acceptable Manufacturers:

1) Rockwood Manufacturing (RO).
2) Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders. The Owner will provide and install the permanent cores and keying under a separate contract.

E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.

1. Acceptable Manufacturers:

   a. Medeco (MC) - Keymark Series.

F. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

1. Existing System: Master key or grand master key locks to Owner's existing system.

G. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Group): Two (2)
2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) – 8200 Series. (Match first phases)

B. Cylindrical Locksets, Grade 1 (Extra-Heavy Duty): ANSI 156.2 Series 4000, Grade 1 certified cylindrical (bored) locksets able to withstand 3000 inch pounds of torque applied to the locked lever without gaining access. Locksets to fit a standard 2 1/8" bore without the use of through-bolts. Lever handles to be made of solid material with no plastic fillers and latchbolt head to be one-piece stainless steel construction encased within the lock body. Furnish with standard 2 3/4" backset, 1/2" throw latchbolt (3/4" at rated paired openings), and universal non-handed.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) – 11 Line. (Match first phases)

C. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) – 10 Line. (Match first phases)

D. Lock Trim Design: As specified in Hardware Sets.

2.6 AUXILIARY LOCKS

A. Cylindrical Deadlocks: ANSI/BHMA A156.5, Grade 1, cylindrical type deadlocks to fit standard ANSI 161 preparation and 1 3/8" to 1 3/4" thickness doors. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) - 480 Series. (Match first phases)
2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

   a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.

   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
   b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.

7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.


9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072” thick, with push rails a minimum of 0.062” thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) - 80 Series. (Match first phases)

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.

1. Acceptable Manufacturers:
   a. Sargent Manufacturing (SA) - 980S Series. (Match first phases)

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
   a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
   b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
   c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
   d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

   B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

   1. Acceptable Manufacturers:
      a. LCN Closers (LC) - 4040XP Series.
      b. Sargent Manufacturing (SA) - 351 Series.

2.10 ARCHITECTURAL TRIM

   A. Door Protective Trim

   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width
and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
   a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).

4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.

6. Acceptable Manufacturers:
   a. Rockwood Manufacturing (RO).
   b. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

   1. Acceptable Manufacturers:
      a. Rockwood Manufacturing (RO).
      b. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

   1. Acceptable Manufacturers:
      a. Rixson Door Controls (RF).
      b. Sargent Manufacturing (SA).
2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:

1. Pemko Manufacturing (PE).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.


3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish, and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. RO - Rockwood
3. SA - Sargent
4. MC - Medeco
5. RF - Rixson
6. NO - Norton
7. PE - Pemko
8. SU - Securitron

Hardware Schedule

HW SET NO: 01
DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
203 205

EACH TO HAVE:

| 3 EA  | HINGE     | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 EA  | PASSAGE SET | L9010 06A    | 626 | SCH |
| 1 EA  | WALL STOP  | WS401CVX     | 626 | IVE |
| 3 EA  | SILENCER   | SR64        | GRY | IVE |

HW SET NO: 02
DOOR NUMBER: (INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING DOORS)
201 202 204

EACH TO HAVE:

| 3 EA  | HINGE     | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 EA  | OFFICE/ENTRY LOCK | L9050HD 06A | 626 | SCH |
| 1 EA  | PERMANENT CORE | FURNISHED BY OWNER | 626 | MED |
| 1 EA  | WALL STOP  | WS401CVX     | 626 | IVE |
| 3 EA  | SILENCER   | SR64        | GRY | IVE |

END OF SECTION 087100
SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Interior borrowed lites.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated. IBC required test results for safety glazing.

B. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

C. Qualification Data: For installers.

D. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance.

B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.


1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.

2. Where glazing units, including Kind FT glass are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.


1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers / Products: Subject to compliance with requirements, provide one of the manufacturers / products specified.

2. Products by other manufacturers are subject to Architect’s approval prior to bidding.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites.

3. For uncoated glass, comply with requirements for Condition A.

4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

5. Provide Kind FT (fully tempered) float glass where safety glass is indicated.

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

2.3 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products and glazing tapes under conditions of service and application.

2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Silicone Glazing Sealants:
   a. Products:
      1) Dow Corning Corporation; 790.
      2) GE Silicones; SilPruf LM SCS2700.
      3) Tremco; Spectrem 1 (Basic).
      4) Sonneborn, Div. of ChemRex, Inc.; Omniseal.
   b. Type and Grade: S (single component) and NS (nonsag).
   c. Use Related to Exposure: NT (nontraffic).

2.4 GLAZING TAPES

A. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with American Architectural Manufacturers Association (AAMA) AAMA 800 for the following types:

1. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

2.7 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units: Class 1 (clear) float glass annealed or Kind HS (heat-strengthened) float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites, and Kind FT (fully tempered) float glass where safety glass is indicated.

1. Manufacturer / Product:
   a. PPG Industries / Starphire or approved equal.

2. Thickness: 1/4”.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants or glazing tapes.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

   a. Gypsum board finish indicated for use in exposed locations.

2. Simulate finished lighting conditions for review of mockups.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.
1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer’s written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. G-P Gypsum.
      c. USG Corporation.

B. Products by other manufacturers are subject to approval by Architect prior to bidding.

C. Type X Interior Gypsum Board:
   1. Thickness: 5/8 inch (15.9 mm).
   2. Long Edges: Tapered.

D. Water-Resistant Gypsum Board, ASTM C 630 / C 630M and as follows:
   1. Type: Type X.
   2. Thickness: 5/8 inch.
   3. Use at all restroom, wet walls (walls to which Plumbing fixtures abut or are attached.)

GYPSUM BOARD 092900 - 2
2.3  TRIM ACCESSORIES

A.  Interior Trim:  ASTM C 1047.
   1.  Material:  Galvanized or aluminum-coated steel sheet.
   2.  Shapes:
      a.  Cornerbead.
      b.  LC-Bead:  J-shaped; exposed long flange receives joint compound.
      c.  L-Bead:  L-shaped; exposed long flange receives joint compound.

2.4  JOINT TREATMENT MATERIALS

A.  General:  Comply with ASTM C 475/C 475M.

B.  Joint Tape:
   1.  Interior Gypsum Wallboard:  Paper.

C.  Joint Compound for Interior Gypsum Wallboard:  For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1.  Prefilling:  At open joints and damaged surface areas, use setting-type taping compound.
   2.  Embedding and First Coat:  For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
      a.  Use setting-type compound for installing paper-faced metal trim accessories.
   3.  Fill Coat:  For second coat, use drying-type, all-purpose compound.
   4.  Finish Coat:  For third coat, use drying-type, all-purpose compound.

2.5  AUXILIARY MATERIALS

A.  General:  Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B.  Laminating Adhesive:  Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1.  Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C.  Steel Drill Screws:  ASTM C 1002, unless otherwise indicated.
   1.  Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
   2.  For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool. Thickness shall match wall / stud depth.

E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

C. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

E. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant. Isolation joints are required between gypsum board and masonry walls whether or not masonry is structural.
F. At fire rated gypsum board assemblies, comply with specific assembly and attachment requirements specified for referenced assemblies. Gypsum board shall be Type-X, non-proprietary.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: As indicated on Drawings.

B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At fire rated walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

2. Fastening Methods: Apply gypsum panels to supports with steel drill screws, except at fire rated assemblies where nailing is specified. See Code Compliance Floor Plan on Drawings.
   a. Except as indicated otherwise, attach gypsum board to framing with screws at 6 inches o.c. at perimeter and 8 inches o.c. in field. At interior shear walls, attach gypsum board per requirements stated on Drawings.

C. Single Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws of lengths indicated to studs and ceiling framing.
   a. Minimum 1 1/4” long screws at 1/2” and 5/8” board.

2. Fasten with nails as indicated on Drawings

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer’s written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use only where indicated.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for FRP.
3. Level 4: At panel surfaces that will be exposed to view and painted or are substrate for vinyl wall covering. Apply light orange peel texture at all surfaces to be painted.

   a. Primer and its application to surfaces is specified in Section 099123. Pre-priming per Section 099123 is required prior to applying orange peel texture.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900
SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.3 DEFINITIONS
A. AC: Articulation Class.
B. CAC: Ceiling Attenuation Class.
C. LR: Light Reflectance coefficient.
D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS
A. Product Data: For each type of product indicated. Ceiling system engineering and/or certification that ceiling suspension system complies with locally applicable provisions of the International Building Code and referenced ASTM standards is required per IBC Sections 803.9.1.1 and 1613.1.

1.5 QUALITY ASSURANCE
A. Source Limitations:
   1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
   2. Suspension System: Obtain each type through one source from a single manufacturer.
B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
   1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

   a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

   1. Suspended acoustical ceiling systems shall be installed in accordance with the provisions of ASTM C 635, ASTM C 636 and the structural requirements in IBC Chapter 16 and ASCE 7 Section 13.5.6. Ceiling engineering done by the manufacturer and incorporated into its installation instructions is acceptable.

1.6 DELIVERY, STORAGE, AND HANDLING

   A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

   B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

   C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

   A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

   A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

   A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

      1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
      2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

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

1. Armstrong World Industries, Inc.;
2. USG Interiors, Inc.;

B. Products by other manufacturers are subject to approval by the Architect prior to bidding.

C. General Use Panels: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Equal to Armstrong “School Zone Fine Fissured”.
2. Type and Form: Type III, mineral base with painted finish; wet formed.
4. Color: White
5. LR: Not less than 0.85.
6. NRC: Not less than 0.55.
7. CAC: Not less than 35.
8. Edge/Joint Detail: Square.
10. Modular Size: 24 by 48 inches (610 by 1220 mm).
11. Antimicrobial Treatment: Broad spectrum fungicide and bactericide fungicide based.
2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:


E. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

F. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILINGS

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

1. Armstrong World Industries, Inc.;
2. Chicago Metallic Corporation;
3. USG Interiors, Inc.;

B. Products by other manufacturers are subject to approval by Architect prior to bidding.

C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.

2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.

D. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C636, ASTM C635, structural requirements of IBC Chapter 16, and ASCE 7, Section 13.5.6, for seismic design requirements. Installation shall also comply with manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structural members.
6. When roof framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to roof deck. Attach hangers to structural members, such as trusses, joists, beams, etc.

8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

10. Install ceiling panels in fixed frames directly attached to roof deck per details on Drawings.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Install hold-down clips in areas indicated and in areas required by authorities having jurisdiction. Space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

a. Install metal pan panels and impact resistant panels with hold-down clips.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Color Selection: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:

   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.
B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

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

   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Flexco, Inc.
   c. Johnsonite.
   d. Roppe Corporation, USA.

2. Products by other Manufacturers are subject to approval by Architect prior to bidding.


1. Material Requirement: Type TS (rubber, vulcanized thermoset).

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: As indicated on Drawings. Not less than 4” if not noted.

E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Finish: As selected by Architect from manufacturer's full range.
I. Colors and Patterns: As selected by Architect from manufacturer’s full range. A maximum of two colors will be selected.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Flexco, Inc.
   c. Johnsonite.
   d. Roppe Corporation, USA.

2. Products by other Manufacturers are subject to approval by Architect prior to bidding.

B. Description: Carpet edge for glue-down applications, Nosing for carpet, Nosing for resilient floor covering, Reducer strip for resilient floor covering, Joiner for tile and carpet, Transition strips, etc.

C. Material: Rubber.

D. Profile and Dimensions: As indicated.

E. Colors and Patterns: As selected by Architect from manufacturer’s full range.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Cove Base Adhesives: Not more than 50 g/L.
   b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

D. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
   b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. 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.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 096513
PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Vinyl sheet floor covering.

1.3 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Samples for Color Selection: For each type of floor covering indicated.
   C. Qualification Data: For qualified Installer.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: A qualified installer who employs workers for this Project who are
      competent in techniques required by manufacturer for floor covering installation and seaming
      methods indicated.
   B. Fire-Test-Response Characteristics: As determined by testing identical products according to
      ASTM E 648 or NFPA 253 by a qualified testing agency.
      1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Store floor coverings and installation materials in dry spaces protected from the weather, with
      ambient temperatures maintained within range recommended by manufacturer, but not less than
      50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.
1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive floor coverings during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

  1. Floor Covering: Furnish quantity not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 VINYL SHEET FLOOR COVERING

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

   1. Armstrong World Industries, Inc.
   2. Mannington Mills, Inc.
   3. Tarkett, Inc.

B. Products by other manufacturers are subject to approval by Architect prior to bidding.

C. Vinyl Sheet Floor Covering with Backing: ASTM F 1303.

   1. Type (Binder Content): Type II, minimum binder content of 34 percent.
   2. Wear-Layer Thickness: Grade 1.
   3. Overall Thickness: 0.080 inch nominal with 50 mil minimum wear layer

D. Wearing Surface: Smooth.
E. Sheet Width: As standard with manufacturer 6 feet (1.8 m).
G. Colors and Patterns: As selected by Architect from full range of industry colors, matching premium price colors and patterns. A maximum of three colors/patterns will be selected.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
C. Seamless-Installation Accessories:
      a. Color: Match floor covering.
D. Integral-Flash-Cove-Base Accessories:
   1. Cove Strip: 1-inch (25-mm) radius provided or approved by manufacturer.
   2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.
   3. Corners: Metal inside and outside corners and end stops provided or approved by manufacturer.
E. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer or of type requested by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
3.3 FLOOR COVERING INSTALLATION

A. Comply with manufacturer's written instructions for installing floor coverings.

B. Unroll floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out floor coverings as follows:

1. Maintain uniformity of floor covering direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:
   1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.

B. Perform the following operations immediately after completing floor covering installation:
   1. Remove adhesive and other blemishes from floor covering surfaces.
   2. Sweep and vacuum floor coverings thoroughly.
   3. Damp-mop floor coverings to remove marks and soil.

C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
   1. Apply four coats.

E. Cover floor coverings until Substantial Completion.
PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Gypsum board.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Samples for Color Selections: For each type of topcoat product indicated.

1.4 QUALITY ASSURANCE
A. MPI Standards:
   1. Products: Complying with Master Painters Institute (MPI) standards indicated and listed in "MPI Approved Products List."

1.5 DELIVERY, STORAGE, AND HANDLING
A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS
A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Benjamin Moore & Co.
2. Columbia Paint & Coatings.
5. PPG Architectural Finishes, Inc.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Typical Paint Colors: As selected by Architect from manufacturer's full range, including colors requiring deep tone tint base. A maximum of 10 colors will be selected. A maximum of 3 of any of the colors selected may be selected for use on walls in any room or space for which paint is indicated. Doors and frames may be required to be painted different colors. Corridor spaces may have a maximum of six different colors at various accent wall, soffit, or wall edge detail.
2.3 BLOCK FILLERS  

2.4 PRIMERS/SEALERS  
A. Interior Latex Primer/Sealer: MPI #50.

2.5 METAL PRIMERS  
A. Quick Dry Primer (Alkyd): MPI #76.

2.6 LATEX PAINTS  
A. High-Performance Architectural Latex (Eggshell): MPI #139 (Gloss Level 3).  
B. High-Performance Architectural Latex (Satin): MPI #140 (Gloss Level 4).  
C. High-Performance Architectural Latex (Semigloss): MPI #141 (Gloss Level 5).

2.7 ALKYD PAINTS  
A. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).  
B. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).

PART 3 - EXECUTION

3.1 EXAMINATION  
A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.  
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:  
   1. Gypsum Board: 12 percent.  
C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.  
D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.  
   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth. Pre-prime all surfaces prior to application of spray texture.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:
   a. Uninsulated metal piping.
   b. Uninsulated plastic piping.
   c. Pipe hangers and supports.
   d. Tanks that do not have factory-applied final finishes.
   e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
   h. Roof top mechanical equipment whether or not factory primed or finish coated.

2. Electrical Work:
   a. Switchgear.
   b. Panelboards.
   c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Substrates:

   1. High-Performance Architectural Latex System: MPI INT 9.2B.
      a. Pre-Prime Coat: Interior latex primer/sealer.

END OF SECTION 099123
SECTION 101400 – SIGNAGE

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes the following:
      1. Panel signs.

1.3 DEFINITIONS

1.4 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Shop Drawings: Show fabrication and installation details for plaques and dimensional letters.
      1. Show text/design, mounting heights, locations of supplementary supports to be provided by others, and accessories.
   C. Samples for Color Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
      1. Decorative Laminated Panel Signs.
      2. Dimensional Letters.

1.5 QUALITY ASSURANCE
   A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
   B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.
1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

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

1. APCO Graphics, Inc.
2. Best Sign Systems Inc.
3. Supersine Company (The)

B. Products by other manufacturers are subject to approval by Architect prior to bidding.

C. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:

1. High-Pressure Decorative Laminate: 0.048 inch (1.21 mm) thick.
2. Edge Condition: Square cut.
3. Corner Condition: Square.
   a. Wall mounted with two-face tape.
5. Color: As selected by Architect from manufacturer's full range.
6. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

D. Panel Sign Schedule:

1. Sign Type: Laminate Panel Signs.
   a. Panels: Colored laminate, color as selected from manufacturer’s standards. 3” high strips, minimum, with square corners.
   b. Letters/Numbers: Raised letters/numbers complying with Americans With Disability Act (ADA), 1” high, white letters / numbers.
   c. Braille: Grade 2 braille located on same background panel as, and located below letters/numbers, with same text as letters/numbers, ADA compliant.
d. Special Signs: At all toilet rooms, provide 6” x 6” standard accessibility symbol plaque in conjunction with “Men”, “Women” and “Toilet Room” text and corresponding pictographs.

e. Quantity: 15 standard size signs, plus special signs noted above.

f. Average letters / characters per sign: 12 on standard signs.

Note: “Average letters per sign” shall be limited only by: Total letters of all signs of given type (standard or oversize) ÷ total number of signs of that type is less than or equal to quantity specified.

2.2 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 FINISHES, GENERAL

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, are sized and located to accommodate signs.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
B. Wall-Mounted Panel Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
2. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
3. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

C. Cast Letters and Bronze Plaque: Install with metal studs in exterior masonry per Manufacturer’s standard details and installation procedures.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400
PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. Specification Section 220000, Plumbing General Requirements, is to be included as part of this Section of the specification.

B. Work Included:

1. This section covers the work necessary to modify the existing system for a complete, satisfactory, and ready to operate wet pipe fire protection system for heated areas and dry pipe fire protection system for non-heated areas (areas subject to freezing). Hazard classification shall be as required by the State Fire Marshal, local City, IBC, IFC, and applicable NFPA Standards.

C. Qualifications of Installer:

1. All work shall be performed by a qualified, competent, licensed Fire Sprinkler Contractor who can furnish a verified list of satisfactory installations of this type and size, for a period of 5 years or more. Fire sprinkler contractor shall be licensed by the Idaho State Fire Marshal, and shall have in his employ an Engineering Technician (Level III), certified by NICET (National Institute for Certification in Engineering Technologies).

D. System Responsibility:

1. All work required for the fire protection system, including design and installation, shall be the responsibility of the Fire Sprinkler Contractor. Coordination with other trades is critical. Contractor shall coordinate his work with all ductwork, piping, electrical, etc., to ensure that all systems can be installed with a minimum of interference. Sprinkler heads shall be located in the center of ceiling tiles in the 2’ dimension and quarter spaced on 12” increments in the 4’ dimension. All piping penetrations through finished walls shall be provided with chrome escutcheons. Submittals which are required are only for the purpose of general coordination. Architect/Engineer assumes no responsibility or liability for the design of the system.

2. All monitoring of valves not shown on the electrical drawings shall be within the scope of work for the fire sprinkler contractor. This shall include, but not be limited to, the following: All conduit and wiring as required to monitor post indicator valves, tamper switches, and any other devices required to be supervised by the fire alarm panel. The sprinkler contractor shall also provide all power, wiring and conduit required for a complete and operational dry-pipe system (if required), unless such electrical is shown on the electrical drawings.
3. All wet piping may be installed flat and level but shall be installed so as to minimize the requirements for auxiliary drains. All exposed piping shall be installed as close to ceilings as possible while maintaining appropriate sprinkler deflector clearances. Piping shall be designed and installed in a neat and symmetrical manor and shall be coordinated with all other trades and building features.

4. Submittals are required are only for the purpose of general coordination. Architect/Engineer assumes no responsibility or liability for the design of the system.

1.2 CODES AND STANDARDS:

A. The sprinkler system is to be designed and installed in accordance with the latest applicable building codes, State and Local Fire Marshals requirements, and all applicable NFPA Standards.

PART 2 - PRODUCTS

2.1 SUBMITTALS:

A. The Engineering Technician shall prepare and submit the following submittal data:

1. Complete equipment list of all equipment to be installed, including manufacturer's name and catalog number.

2. Layout drawing of complete sprinkler system indicating relationship of all other overhead items, including ductwork, lights, and structural members.

3. Complete details and sections as required to clearly define and clarify the design.

4. Plot plan indicating location of all underground connections, piping, valves, and related items.

5. Complete building section showing location of piping, sprinklers and applicable equipment in relation to other construction features.

6. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable style or series number.

7. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

8. Sprinklers valve and equipment model numbers shall be specifically identified on drawings and shall match submittal data provided.

2.2 MATERIALS AND EQUIPMENT:
A. All materials shall be as specified below, or in accordance with applicable NFPA Standards:

1. Piping shall be black steel per NFPA 13 requirements and shall have a factory applied interior MIC or corrosion resistant coating. Piping shall be new and relatively free of exterior rust or corrosion. Piping with excessive rust or corrosion may be rejected. Threadable, thin wall piping will not be allowed. CPVC is allowed for underground only.

2. Fittings shall be 125 psi screwed cast or malleable iron for all threaded piping.

3. Fittings shall be Victaulic FireLock®, Anvil Gruviok, Grinnell or Shurjoint fire protection products for all grooved or plain end piping. Couplings shall consist of two ductile iron housings conforming to ASTM A536, a pressure responsive elastomer gasket, and zinc electroplated carbon steel bolts and nuts. Rigid type or flexible type where necessary.
   a. Rigid Type: Housings shall be cast to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall only be permitted if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer’s recommendations. Contractor shall remove and replace any improperly installed joints. 11/4” and Larger: Standard rigid joint equal to Victaulic FireLock® Style 009 or equal.
   b. Flexible Type: Use in seismic areas where required by NFPA 13, Victaulic Style 75 or 77 or equal.

4. Dry pipe valves shall be installed in system risers per local water purveyor requirements.
   a. Dry Pipe Valve: Reliable EX Low Pressure Dry Valve (or preapproved equal, prior to award) shall be provided. Low differential, latched clapper design, black enamel coated ductile iron body, aluminum bronze clapper, with external reset and nitrogen system trim package. Valve internal parts shall be replaceable without removing the valve from the installed position and be externally resettable. Valve shall be pre-trimmed with shut-off valve, 3-way ball valve, and actuator. Required system pressure shall be per manufacturer’s requirements. Valve shall have grooved ends for vertical installation only.
   b. Dry pipe systems shall not exceed 750 gallons of total system volume for any reason, regardless of code allowances. The Fire Sprinkler Contractor is to determine how many systems are required and provide the correct number of systems as determined by their design.

5. Wet pipe risers shall be equipped with a Reliable brand alarm valve / system check valve.

6. Butterfly control valves with supervisory tamper devices shall be installed for system control.

7. All materials and equipment shall conform to the requirements of Underwriter Laboratories (UL) or Factory Mutual Global (FMG), and shall be so stamped.
8. Sway Bracing, both lateral and longitudinal, shall be required and shall be installed per applicable NFPA Standards.

9. Sprinkler heads shall match existing.

10. Hangers, drains, and Inspectors Test Connections shall be installed in accordance with applicable NFPA Standards.

11. All piping penetrations through finished walls shall be provided with chrome escutcheons.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Upon completion of the system, secure the inspection of the required authorities and perform such tests as may be required to demonstrate compliance with local and state standards. Upon acceptance of the system by the inspecting authority, inform the Architect/Engineer in writing, showing proof of acceptance. Submit all required test certificates to required authorities.

3.2 INSTALLATION:

A. Grooved joint piping systems shall be installed in accordance with the manufacturer’s guidelines and recommendations. All grooved couplings, fittings, valves and specialties shall be supplied by a single manufacturer. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by grooved pipe manufacturer. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. Contractor’s field personnel shall be properly trained in the installation of the manufacturer’s grooved piping products. A Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

B. The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any tools to remove bulb protectors.

END OF SECTION 210000
DIVISION 22 - PLUMBING

SECTION 220000 – PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The Bidding Requirements, Contract Requirements, and the General Requirements (Division 01) of these specifications shall govern all parts of the work.

B. Work Included:

1. Install work in accordance with these specifications and the accompanying plans. Furnish all labor, material, and equipment together with all incidental items not specifically shown or specified which are required by good practice to provide the complete plumbing systems as described.

C. Coordination and Site Visits:

1. This section of the work requires examination of and reference to all architectural, structural, utility, and electrical drawings for construction conditions that may affect the work. Inspect the building site and existing facilities for verification of existing conditions. Base all measurements from established benchmarks. Any discrepancy between actual measurements and those indicated, which prevents following good practices or the intent of the drawings and specifications, shall be reported to the Architect/Engineer, and work halted until instructions are received from the Architect/Engineer.

1.2 CODES, PERMITS, FEES:

A. Install all work in accordance with applicable codes and standards. Obtain all required permits; pay all required fees including utility connections or extensions, in connection with this portion of the construction. Obtain all required certificates of inspection for the work.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

A. Materials:

1. All materials and equipment shall be of first quality, new, full size and weight, standard in every respect, and suitable for the space required. Use the same manufacturer for products of similar class or service, such as valves and pumps. Protect all materials against loss, theft, or damage before and after installation.
2. Furnish and install all necessary foundations, supports, pads, bases, and piers required for all materials and equipment furnished under this contract.

3. Provide all required firestopping at piping penetrations of fire rated walls, floors, ceilings, and roofs. Firestopping shall be Dow Corning Fire Stop Sealant 2000 or Fire Stop Foam 2001, or approved equal.

4. Provide a heat-expanding fire collar for all non-metallic piping up to 6” size at penetrations of fire rated walls, floors, and ceilings per ASTME 814.

B. Workmanship:

1. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists for each subtrade. Work shall be installed to the satisfaction of the Architect/Engineer with unsatisfactory work removed and reinstalled to his satisfaction at no extra cost to the Owner.

2. Provide all cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces. No structural members shall be cut without the approval of the Architect/Engineer. Provide all sleeves and inserts required before the floors and walls are built.

3. Locate all equipment that must be serviced in fully accessible positions. Provide clearance for removal of replacement parts and components, and with necessary couplings or flanges to remove the component for maintenance.

2.2 SUBMITTALS AND SUBSTITUTIONS:

A. Prebid Approval:

1. Manufacturer’s trade names and catalog numbers stated herein are intended to indicate the quality of equipment or materials desired. All manufacturers not specifically listed require prior approval. Submit catalog data, including specifications, of the proposed equipment to the Architect/Engineer for his approval at least 10 calendar days prior to bid opening. Notice of such approvals will be published in an addendum. Approval of listed alternate equipment manufacturers is for bidding only. Final approval is to be based on requirements of the plans and specifications.

B. Submittals:

1. Within thirty days after award of this contract, provide six copies of a complete list of all materials and equipment proposed for this project. List shall contain make, type, manufacturer's name, and trade designation of all materials and equipment. Submittal shall also include manufacturer's complete specification for each item, including ratings, and dimensions as required to check space requirements. Provide six copies of all submittals. The scheduled equipment is the basis of design for physical size, etc. Alternate manufacturers shall not exceed the weight or physical size. Any changes to the Architectural, Structural and Mechanical systems due to alternate manufactures shall be the responsibility of the Contractor and Supplier. Submittals for fixtures, trim, and other plumbing related items, requiring submittals, shall be submitted in a single complete
package. Individual items will not be reviewed independently unless approved by the Engineer. Electronic submittals will be allowed when approved by the Architect and, or Owner. The requirements of electronic submittals are the same as those noted above.

2. Approval of submittals shall not relieve the contractor from responsibility for deviations from the plans or specifications, unless he has, in writing, called the Architect's /Engineer's attention to deviations at the time of submission, and obtained his written approval. Approval of submittals does not relieve the contractor from responsibility for errors in shop drawings or literature.

C. Equipment Requiring Submittals:

1. Plumbing Fixtures & Trim
2. Valves
3. Cast Iron Soil Piping

PART 3 - EXECUTION

3.1 ACCESSIBILITY & SAFETY:

A. Accessibility:

1. All equipment which must be serviced or operated shall be located in fully accessible position. Minor changes from the drawings may be made to allow for better accessibility. All changes shall be approved prior to actual installation.

2. Access panels shall be provided if required for accessibility. Access panels to be steel, flanged, hinged doors by Cendrex, model AHD, or equal. Size as required for installation. Subcontractor shall furnish the required panels to the General Contractor and the required location for all access panels, unless otherwise specified in the Architectural specifications. Panels shall be installed by the General Contractor.

B. Safety:

1. No water piping shall run immediately over or within a 3-foot plan view clearance of any electrical panel or motor starter. Where piping must be located within these zones, install piping inside a conduit to prevent water access to electrical equipment.

3.2 COORDINATION:

A. Coordinate all work with the various trades involved to provide a complete and satisfactory installation. The exact details of piping and equipment are not shown. No additional compensation will be made for offsets or relocation required in coordination with other trades.

B. Alterations required due to improper supervision by the subcontractor shall be made at no extra cost, to the satisfaction of the Architect/Engineer.
3.3 IDENTIFICATION AND CODING:

A. General:

1. The Contractor shall use ASME 13 standards for all piping identifications, color coding, and compliance.

B. Painting:

1. All painting of equipment, accessories, and piping shall be furnished and applied under the Architectural section of these specifications. All painting shall be completed before any identification markings are applied.

C. Piping:

1. Identify all piping as to the service of the pipe and the direction of flow. The letters shall be 3/4 inch high on piping two inches or smaller, and 1-1/4 inches high on piping up to six inches. Flow arrows shall be at least six inches long. The letters and flow arrows shall be made by precut stencils and oil base paint, one inch high and black, or factory fabricated plastic pipe markers. Piping shall be identified at 25 foot maximum intervals, on long continuous lines; adjacent to each item of equipment; on each riser and junction, and on both sides of all wall penetrations. Underground piping shall be identified with bright colored continuously printed plastic tape of not less than 6" wide by 4 mil thick, manufactured for direct burial service. Install directly above all buried pipe, 6 to 8 inches below finished grade.

D. Valves:

1. Regardless of size, all valves shall be tagged with a numbered brass tag, 1-1/2 inches by 3 inches minimum in size and 0.051 inch thick. A valve chart indicating valve tag number, location, service, and normal position shall be mounted in a suitable framed and glassed cover in the main mechanical room or as directed. Valve chart shall be duplicated in the Maintenance and Operations Manual.

3.4 TESTING:

A. Piping:

1. All plumbing piping (drainage, water, gas) shall be tested in accordance with the requirements of local adopted plumbing code, latest edition. Other piping systems shall be tested hydrostatically to 1.5 times the operating pressure but not less than 100 psi, for a minimum period of two hours. If the test pressure falls more than 5 percent during the test period, the leak shall be located, repaired, and the test repeated.

2. Piping shall be tested before insulation has been installed. Delicate control mechanisms shall be removed during tests to prevent shock damage. The use of chemicals or compounds to stop leaks shall not be permitted.

3. A test report shall be submitted for each piping system test. Test report forms are part of Specifications Section 220100, or are available from the Engineer.
B. Systems:

1. All plumbing systems shall be tested at the completion of the building to establish that the systems operate as specified and required.

3.5 CLEANING AND ADJUSTING:

A. Thoroughly clean all parts of the system at the completion of the work. Flush all water circulating systems with fresh water and then drain. Clean all strainers and refill system. Adjust all devices for proper operation and lubricate all equipment as required. Repaint any painted surface that has been damaged.

B. All potable water systems shall be flushed and disinfected after tests are completed. Disinfection shall be in accordance with local municipal and State Plumbing Inspector’s criteria. In lieu of such criteria, the following procedure shall be followed for disinfection:

1. Completely flush system. Add alkali or acid (hydrochloric) to bring water ph level to between 7.4 and 7.6.

2. Inject chlorine (liquid, powder, tablet, or gas) throughout the system to obtain 50 to 80 mg/L residual.

3. Bleed water from outlets to ensure distribution, and test for residual at a minimum of 15 percent of the outlets.

4. Maintain disinfection in system for 24 hours.

5. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

6. Flush disinfectant from system until residual is equal to that of incoming water, or 1.0 mg/L.

7. Take samples no sooner than 24 hours after flushing, from 10 percent of the outlets and the incoming water.

3.6 PROJECT CLOSEOUT:

A. Operations & Maintenance Manual:

The Contractor shall provide an operations and maintenance manual at least thirty days prior to completion of work. The manual shall be of the three ring binder type, entitled "Operations and Maintenance Manual", with the job name and year of completion also included. O & M manuals shall be submitted in a single package. Individual items will not be accepted independently unless approved by the Engineer. The manual shall include, as a minimum:

1. Maintenance instructions for all equipment, including lubrication requirements.

2. Fixture supplier’s names, addresses, and telephone numbers.

3. Fixture catalog cuts, ratings tables, model numbers, serial numbers, and accessories.
4. Parts numbers for all replaceable parts.
5. Valve tagging chart as hereinbefore specified.
7. Any additional information required to enable the Owner to properly maintain the building plumbing system.
8. After approval of the Operations and Maintenance Manual by the Architect/Engineer, the Contractor shall furnish two copies of the manual to the Owner.

B. As-Built-Drawings:

1. Provide two sets of blue-line mechanical drawings showing the work as it was actually installed. The drawings shall indicate all departures from the contract drawings, and shall locate all underground utility lines with dimensions from established building lines. Make all notations neat and legible, with red indelible pencil. At the completion of the work, these as-built drawings shall be signed and dated by the Plumbing Contractor, and returned to the Architect/Engineer.

C. Guarantee:

1. All work furnished under this section shall be guaranteed in writing to be free from defective work or materials for a period of one year after acceptance of the contract. All repairs or replacements because of defective materials or workmanship or noncompliance with code shall be provided without additional cost to the Owner. Contractor shall furnish a letter indicating above guarantee with space for date of acceptance and expiration of guarantee. Letter shall be included in O & M Manual.

END OF SECTION 220000
PART 1 - GENERAL

1.1 SCOPE:

A. This section covers the work necessary for the plumbing system, complete. The Plumbing General Requirements, Section 220000, are to be included as a part of this section of the specifications.

1.2 CODES:

A. The plumbing system shall be installed in accordance with the requirements of local adopted plumbing code, latest edition, International Fuel Gas Code, latest edition; and all local and State Codes.

1.3 FIXTURES & EQUIPMENT:

A. General:

1. Plumbing fixtures and equipment shall be as listed on the drawings. In addition to those specifically listed, the following manufacturers are approved for bidding only. All other manufacturers require prior approval. Final approval for installation is based on submittal data furnished:
   e. Stainless Steel Sinks: Elkay, Just.
   g. Sensor Faucets: Chicago Faucets, Symmons, Sloan, Mac Faucets.
   h. Valves and Trim: T&S Brass, Dearborn Brass, Brasscraft, ProFlo, & Sloan.
   i. Flush Valves: Sloan, Delany, Delta and Zurn, American Standard Selectronic, Kohler, Moen (sensor-operated only) & AMTC.
   i. Carriers and Drainage Products: Jay R. Smith, Josam, Zurn, Wade, Watts, Neenah Foundry, NDS, & MIFAB.
   j. Toilet Seats: Bemis, Church, Comfort Seats, Beneke, Zurn, American Standard, & Kohler.
m. Drinking Fountains/ Electric Water Coolers: Haws, Oasis, Stern Williams, Halsey Taylor, Elkay, Sunroc.


q. Service Sinks: Fiat, Acorn, Stern Williams, Zurn, Proflo, Mustee.


s. Backflow Preventers: Watts, Conbraco/ Apollo, & Wilkins.

t. Hose Bibbs: Woodford, Josam, Zurn, J.R. Smith, Prier.


v. Utility Sinks: Fiat, Proflo, Mustee.

2. Plumbing Fixture Standards:
   All plumbing fixtures shall meet or exceed the following standards:
   a. ANSI A112.6.1 - Supports for Off-the Floor Plumbing Fixtures for Public Use.
   b. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
   d. ANSI A112.19.2 - Vitreous China Plumbing Fixtures.
   e. ANSI A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
   f. ANSI A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.
   g. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
   h. ANSI Z124.1 - Gel-Coated Glass-Fiber Reinforced Polyester Resin Bathtub Units.
   i. ANSI Z124.2 - Gel-Coated Glass-Fiber Reinforced Polyester Resin Shower Receptor and Shower Stall Units.
   j. ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.
   k. ARI 1010 - Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.
   l. AWSI/ASSE 1001 – Atmospheric Vacuum Breaker
   m. ANSI/ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
   n. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
   o. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
   p. ANSI/ASSE 1015 – Backflow Preventers, Double Check Principle
   q. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
   r. AWSI/ASSE 1020 – Pressure Vacuum Breaker
   s. AWSI/ASSE – 1-52 – Hose Connection, Double Check
   t. ANSI A112.21.1 - Floor Drains.
   u. ANSI A112.21.2 - Roof Drains.
   w. PDI WH-201 - Water Hammer Arresters.
   x. ANSI/AWWA C606 – Grooved and Shouldered Joints

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES & TRIM:

A. All plumbing fixtures shall be provided complete with all required trim for a complete and
operational system. All piping penetrations through finished walls shall be provided with chrome escutcheons. All plumbing fixtures shall be caulked and sealed to surrounding surfaces. All sink traps shall be provided with a cleanout plug in the bottom of the trap. All interior exposed pipe, valves, and fixture trim shall be chrome plated, including kitchen compartment sinks. Braided stainless steel pipe risers are approved for concealed locations only, such as behind casework doors or lav shields. Each fixture shall be provided with stop valves and the stop valves shall be quarter-turn brass ball type. All fixtures and trim must be lead free. All floor drains and floor sinks shall be provided with trap primers (PPP, Zurn or Wade as needed for appropriate use. Provide ball valve type shut-off valve upstream of all trap primer valves).

2.2 PIPING AND FITTINGS:

A. General:

1. Underground sanitary sewer and storm drain lines shall be installed at 1/4" per foot slope, unless otherwise indicated. If such slope is not possible due to existing inverts, approval shall be obtained from the Architect/Engineer and the authority having jurisdiction before any piping is installed at a lesser slope.

2. Connections between piping of dissimilar materials shall be made with dielectric waterway fittings or unions.

3. Provide standard manufactured water hammer arresters at all flush valves. Size and locate per manufacturers recommendations. Provide access panels for access to all water hammer arresters.

B. Domestic & Non Potable Hot and Cold Water:

1. Piping inside building above slab or above grade in crawl space shall be ASTM B88, Type "L", hard drawn copper. Fittings shall be ANSI/ASME B16.22 cast brass, or ANSI/ASME B16.29 wrought copper. Joints shall be ANSI/ASTM B32 solder, Grade 95-5, lead free.

C. Sanitary Sewer and Vent:

1. Piping shall be cast iron CISPI 301, ASTM A888 hubless, with cast iron fittings. Standard Couplings shall be neoprene gaskets and stainless steel clamp-and-shield assemblies and shall conform to CISPI 310, ASTM C 1277, FM 1680, & IGC-237, and be listed NSF International. Heavy Duty Couplings shall conform to ASTM C 1540. Pipe and fittings shall be manufactured by AB&I, Charlotte, Tyler, or receive prior approval.

2. All 90 degree waste line elbows shall be formed per the latest issue of the adopted plumbing code, latest edition.

3. All exposed vent piping located in occupied areas or rooms, is to be cast iron with cast iron fittings.
4. All flush valve fixtures that are installed back to back shall have offset waste outlet fittings.

5. Cleanouts shall be provided at each horizontal drainage pipe, at its upper terminal, and each run of piping which is more than 100 feet, and shall be provided for each 100 feet developed length, or fraction thereof of such piping. An additional cleanout shall be provided for each aggregate horizontal change of direction exceeding one hundred and thirty-five degrees, per applicable plumbing code. This shall be provided regardless of what is shown on the drawings.

6. All floor drains, floor sinks, and hub drains shall be installed with a trap primer.
   a. Flush Valve Primer: Trap primer shall be Precision plumbing products model FVP-1VB with vacuum breaker.
   b. Pressure Activated Primer: Trap primer shall be Precision plumbing products Model CPO-500 with DU distribution unit if required.

7. All vent’s through roof (VTR’S) shall be extended at least 1 foot above the roof surface, or to the top of the closest adjacent parapet wall, whichever is greater.

D. Hanger and Supports:

1. Pipe hangers shall be provided to adequately support all piping systems. Hangers shall be vertically adjustable to provide for proper pitch and drainage. Hangers shall allow for expansion and contraction of the piping system. Reference “General Regulations” of the latest edition of the adopted plumbing code, latest edition.

2. Hangers for pipe sizes 1/2 to 6 inches shall be adjustable clevis type, or unistrut saddles with all-thread hanger rod.

3. Hangers for hot pipe, sizes 6 inches and over shall be adjustable steel yoke, cast iron roll, double hanger type.


5. All insulated piping shall be provided with minimum 18 gauge galvanized insulation shields, 12 inches long, and oversized hangers. Pipe sizes 2 inches and over shall also be provided with 12 inch long calcium silicate insulating blocks between the piping and the galvanized insulation shield.
   a. Alternate: Insulated pipe support inserts may be provided at hanger, support, and guide locations on piping requiring insulation. The insert should consist of either Hydrous Calcium Silicate or Polyisocyanurate Foam insulation (Urethane) encircling the entire circumference of the pipe with a 360 deg. PVC (1.524 mm thick) or galvanized steel jacket and installed during the installation of the piping system. These insulated pipe support inserts shall be provided by the Mechanical Contractor and installed by the same during pipe support installation.

6. Hanger rod sizing and spacing for pipe shall be as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Minimum Rod Diameter</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>To 1-1/4 inches</td>
<td>3/8 inch</td>
<td>6.5 feet</td>
</tr>
</tbody>
</table>
7. Provide hangers within 12 inches of each horizontal elbow.

8. Provide hangers with minimum 1-1/2 inches vertical adjustment.

2.3 INSULATION:

A. General:

1. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

2. Fire-Test-Response Characteristics: Insulation and related materials NFPA 255, UL Classified per UL 723 or meeting ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement containers, with appropriate markings of applicable testing and inspecting agency.
   a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
   b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

B. Piping:

1. All domestic, potable & non-potable, hot and cold water lines shall be insulated with preformed insulation.
   a. Fiberglass insulation with a vapor barrier jacket. Insulation shall have a conductivity not exceeding 0.28 Btu-inch/hour-sq. ft.-degrees F. Laps and butt joints shall be sealed with pressure sensitive joint sealing tape of the same finish as the insulation jacket to provide a continuous vapor seal. Fittings and valves shall be insulated with PVC fitting covers and fiberglass insulation inserts, or with hydraulic setting insulating cement and four ounce canvass jacket with vapor barrier adhesive.

Insulation thicknesses shall be as follows:

<table>
<thead>
<tr>
<th>System</th>
<th>Pipe Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Cold Water (pot. &amp; non-pot.)</td>
<td>⅛” and above</td>
</tr>
<tr>
<td>Domestic Hot Water &amp; Recirc. (pot. &amp; non-pot.)</td>
<td>½”</td>
</tr>
</tbody>
</table>

2. Insulation shall be installed in strict accordance with manufacturer’s instructions.
3. Insulation shall be continuous through penetrations.

4. All insulation shall be installed in a neat and workmanlike manner.

2.4 VALVES & STRAINERS:

A. Ball Valves:

1. Valves 2-inches and smaller shall be lead free cast bronze body, chrome-plated brass ball, teflon seats, and lever handle, 600 psi CWP. Valves shall comply with MSS SP-110, NSF/ANSI 61, NSF/ANSI 372 Lead Free. Valves over 2-inches shall be cast steel body, chrome plated steel ball, teflon seats, and lever handle. Victaulic, Anvil Gruvlok, Grinnell, or Shurjoint ball valves are acceptable if grooved piping is used. Valves mounted higher than 7'-0” A.F.F. shall be provided with chain, wheel, and guides. Basis of design: Apollo #77CLF-A Series.

B. Butterfly Valve:

1. Valves 12-inches and smaller shall be ductile iron lug body, ASTM A-536, 316 stainless steel disc, EPDM Liner, 316 stainless steel stem, and safety twist-lock multi-position lever handle with open-closed lockout capabilities. Valve shall be rated at 175 psig WOG. Valves mounted higher than 7'-0” A.F.F. shall be provided with chain wheel and guides. Valves shall comply with MSS SP-67. Victaulic, Anvil Gruvlok, Grinnell, or Shurjoint butterfly valves are acceptable if grooved piping is used.

C. Check Valves:

1. Valves 2-inches and smaller shall be bronze body Y-pattern, ASTM A-62, swing check, bronze disc, 200 psi WOG. Valves shall comply with MSS SP-80, NSF/ANSI 61-8 F&G, NSF/ANSI 372 Lead Free. Valves, over 2-inches shall be iron body, ASTM A-126, bronze trim, swing check, renewable disc and seat. Valves shall comply with MSS SP-71. Victaulic, Anvil Gruvlok, Grinnell, or Shurlock check valves are acceptable if grooved piping is used. Basis of design: Apollo # 161T-LF/161S-LF Lead Free Bronze, Apollo # 920F-LF Lead Free Cast Iron.

2. Swing check valves with outside lever and spring (not center guided) is to be used on sewage ejector or storm-water sump pumps. Basis of design: Apollo # 910FLW-LF Lead Free Cast Iron.

D. Pressure Reducing Valves:

1. Valves 2-inches and smaller shall be bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, and single union end. Basis of design: Apollo # 36ELF Series Lead Free Bronze.

E. Balance Valve:

1. Valve shall have a twin tube 316 S.S. design with blowout proof attachment to station body. Ports shall include ¼” port for thermometer, ¼” port for pressure gauge, air vent, and ½”drain port.
2. The instrument station shall be 120/150-flanged construction.

3. The butterfly valve shall be lug pattern with a rating of 200 WP, 250 deg. F. The valve shall have an infinite. Position operator with memory stop (6” and smaller), worm gear with memory stop (8” and larger).

F. Strainers:

1. Strainers shall be cast steel body, Y-pattern, 20-mesh stainless screen. Victaulic, Anvil Gruvlok, Grinnell, or Shurjoint strainers are acceptable if grooved piping is used.

PART 3 - EXECUTION

3.1 WORKMANSHIP:

A. General:

1. Install all piping, fixtures, equipment, and accessories as shown, and in strict accordance with the plumbing laws, rules, and regulations of the State and/or City. All work shall be done in a neat and orderly fashion, and left in a condition satisfactory to the Architect/Engineer.

B. Piping:

1. All piping shall be run parallel or perpendicular to established building lines. Install piping so as to allow for expansion. Waste and vent piping occurring above floor slab shall be installed true and plumb. Extend vents at least 1 foot above roof, or to the top of the closest adjacent parapet wall, whichever is greater, and provide watertight flashing sleeves. Excavation and backfill shall be in accordance with Section 220000 of these specifications.

C. Fixtures:

1. Install fixtures true and plumb with building walls. Caulk all plumbing fixtures at joints along walls, countertops, and other intersecting surfaces. Locate fixtures as shown and per manufacturer's instructions. Furnish all required trim for fixtures to provide a complete and workable installation.

3.2 TESTS:

A. General:

1. All piping, fixtures, and equipment shall be inspected and approved before concealing or covering. All work shall be tested as required by Section 220000 of these specifications, and shall be leak proof before inspection is requested. All tests shall be repeated if required by those making the inspection.

2. All potable water systems shall be flushed and disinfected in accordance with Section 220000 of these specifications. Following disinfection, system shall be flushed and water sampled to show compliance with requirements of public health authority having
jurisdiction. If tested water does not meet requirements, disinfecting shall be repeated until water quality meets requirements.

B. Fixtures and Equipment:

1. Fill all plumbing fixtures with water and check for leaks or retarded flow. Repair as required. Adjust each piece of plumbing equipment as required to insure proper functioning. Leave all fixtures and equipment in first class operating condition.

2. The Plumbing Contractor is responsible for all backflow devices to be inspected by a certified backflow technician before use of the building potable water system.

C. Smoke Test:

1. A smoke test shall be performed on the entire waste and vent system before building occupancy. After all fixtures are permanently connected and traps are filled with water, fill entire drainage systems with smoke under pressure of 1.3 pKa (1 inch of water) with a smoke machine. If leaks are detected, they shall be repaired and the smoke test shall be performed again until no leaks are found.

END OF SECTION 220100
PART 1 - GENERAL

1.1 SCOPE:

A. General:

1. The Bidding Requirements, Contract Requirements, and the General Requirements (Division 1) of these specifications shall govern all parts of the work.

B. Work Included:

1. Install work in accordance with these specifications and the accompanying plans. Furnish all labor, material, and equipment together with all incidental items not specifically shown or specified which are required by good practice to provide the complete mechanical systems as described.

2. The HVAC Contractor(s) and all Sub-tier Contractors shall provide installed equipment cut sheets and purchase orders required for utility rebates.

C. Coordination and Site Visits:

1. This section of the work requires examination of and reference to all architectural, structural, utility, and electrical drawings for construction conditions that may affect the work. Inspect the building site and existing facilities for verification of existing conditions. Base all measurements from established benchmarks. Any discrepancy between actual measurements and those indicated, which prevents following good practices or the intent of the drawings and specifications, shall be reported to the Architect/Engineer, and work halted until instructions are received from the Architect/Engineer.

1.2 CODES, PERMITS, FEES:

A. Install all work in accordance with applicable codes and standards. Obtain all required permits; pay all required fees including utility connections or extensions, in connection with this portion of the construction. Obtain all required certificates of inspection for the work.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

A. Materials:

1. All materials and equipment shall be of first quality, new, full size and weight, standard in
every respect, and suitable for the space required. Use the same manufacturer for products of similar class or service, such as valves, pumps, controls, and air handlers. Protect all materials against loss, theft, or damage before and after installation.

2. Furnish equipment that will operate under all conditions of load without any sound or vibration that is objectionable in the opinion of the Architect/Engineer. Vibration or noise considered objectionable will be corrected by the Subcontractor at his expense.

3. Furnish and install all necessary foundations, supports, pads, bases, and piers required for all materials and equipment furnished under this contract.

4. Provide all required firestopping at duct penetrations of fire rated walls, floors, ceilings, and roofs. Firestopping shall be Dow Corning Fire Stop Sealant 2000 or Fire Stop Foam 2001, or approved equal.

B. Workmanship:

1. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists for each subtrade. Work shall be installed to the satisfaction of the Architect/Engineer with unsatisfactory work removed and reinstalled to his satisfaction at no extra cost to the Owner.

2. Provide all cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces. No structural members shall be cut without the approval of the Architect/Engineer. Provide sleeves at all piping penetrations of exterior walls and floors on grade. Provide all sleeves and inserts required before new floors and walls are built.

3. Locate all equipment that must be serviced in fully accessible positions. Provide clearance for removal of replacement parts and components, and with necessary couplings or flanges to remove the component for maintenance.

C. Protection of Equipment During Construction:

1. At the end of each shift, all duct openings and open ends shall be covered with a plastic poly sheathing film to protect against dust and construction contamination from entering the ductwork.

2.2 SUBMITTALS AND SUBSTITUTIONS:

A. Prebid Approval:

1. Manufacturer’s trade names and catalog numbers stated herein are intended to indicate the quality of equipment or materials desired. All manufacturers not specifically listed require prior approval. Submit catalog data, including specifications, of the proposed equipment to the Architect/Engineer for his approval at least 10 calendar days prior to bid opening. Notice of such approvals will be published in an addendum. Approval of listed alternate equipment manufacturers is for bidding only. Final approval is to be based on requirements of the plans and specifications.
B. Submittals:

1. Within thirty days after award of this contract, provide six copies of a complete list of all materials and equipment proposed for this project. List shall contain make, type, manufacturer's name, and trade designation of all materials and equipment. Submittal shall also include manufacturer's complete specification for each item, including capacities, ratings, etc., and dimensions as required to check space requirements. Provide six copies of all submittals. The scheduled equipment is the basis of design for capacity, weights, physical size, etc. Alternate manufacturers shall not exceed the weight or physical size. Any changes to the Architectural, Structural, Mechanical, Electrical, and Control systems due to alternate manufactures shall be the responsibility of the Contractor and Supplier. Submittals for each major trade (i.e., dryside HVAC, wetside HVAC, or Plumbing) shall be submitted in a single complete package. Individual items will not be reviewed independently unless approved by the Engineer. Electronic submittals will be allowed when approved by the Architect and, or Owner. The requirements of electronic submittals are the same as those noted above.

2. Approval of submittals shall not relieve the contractor from responsibility for deviations from the plans or specifications, unless he has, in writing, called the Architect's/Engineer's attention to deviations at the time of submission, and obtained his written approval. Approval of submittals does not relieve the contractor from responsibility for errors in shop drawings or literature.

C. Equipment Requiring Submittals:

1. Flexible ductwork

2. Grilles and diffusers

PART 3 - EXECUTION

3.1 ACCESSIBILITY & SAFETY:

A. Accessibility:

1. All equipment which must be serviced or operated shall be located in fully accessible position. Minor changes from the drawings may be made to allow for better accessibility. All changes shall be approved prior to actual installation.

2. Access panels shall be provided if required for accessibility. Access panels to be steel, flanged, hinged doors by Cendrex, or equal. Sized as required for installation. Subcontractor shall furnish the required panels to the General Contractor and the required location for all access panels, unless otherwise specified in the Architectural specifications. Panels shall be installed by the General Contractor.

B. Safety:

1. Subcontractor shall provide guards for all belt drives and rotating machinery.
3.2 COORDINATION:

A. Coordinate all work with the various trades involved to provide a complete and satisfactory installation. The exact details of ductwork and equipment are not shown. No additional compensation will be made for offsets or relocation required in coordination with other trades.

B. Alterations required due to improper supervision by the subcontractor shall be made at no extra cost, to the satisfaction of the Architect/Engineer.

3.3 ELECTRICAL:

A. Electric motors required for equipment specified in this section shall be provided and installed by this Subcontractor. Motor starters, disconnects, relays, pilot lights, etc., are in general, to be furnished and installed by the Electrical Contractor. Starters, relays, controls, etc., which are factory assembled into packaged equipment shall be furnished by the Mechanical Contractor under this section of the specifications.

B. All motors shall be provided with adequate starting and protective equipment as specified or required. Motor capacity shall be sufficient to operate driven device under all conditions of operation and load without overload. Minimum horsepower shall be as specified.

3.4 IDENTIFICATION AND CODING:

A. Painting:

1. All painting of mechanical equipment, accessories and ductwork shall be furnished and applied under the Architectural section of these specifications. All painting shall be completed before any identification markings are applied.

B. Equipment:

1. Identify all equipment with a black Formica label, with white reveal when engraved. Lettering to be 3/16 inch high minimum. In general, identify equipment as to area served in addition to title and code number of the equipment as taken from the plans.

C. Piping:

1. Identify all piping as to the service of the pipe and the direction of flow. The letters shall be 3/4 inch high on piping two inches or smaller, and 1-1/4 inches high on piping up to six inches. Flow arrows shall be at least six inches long. The letters and flow arrows shall be made by precut stencils and oil base paint, one inch high and black, or factory fabricated plastic pipe markers. Piping shall be identified at 25 foot maximum intervals, on long continuous lines; adjacent to each item of equipment; on each riser and junction, and on both sides of all wall penetrations. Underground piping shall be identified with bright colored continuously printed plastic tape of not less than 6" wide by 4 mil thick, manufactured for direct burial service. Install directly above all buried pipe, 6 to 8 inches below finished grade.

3.5 TESTING:
A. Systems:

1. All systems, including heating, ventilating and air conditioning, shall be tested at the completion of the building to establish that the systems operate as specified and required. Testing shall be performed after air balancing is completed.

2. All controls shall be calibrated accurately and all equipment shall be adjusted for satisfactory operation. Excessive vibration or noise from any system shall be corrected.

3. The air conditioning system shall be tested for satisfactory operation when the outside air temperature reaches 60 degrees F. or warmer. All other systems shall be tested at building completion. All tests shall be performed in the presence of the Architect/Engineer or his representative.

3.6 BALANCING:

A. Scope:

1. Prior to final acceptance by the Owners, all air systems shall be balanced to deliver the quantities as specified or directed. The air balance shall be performed by an independent agency specializing in balancing and is certified by the National Environmental Balancing Bureau.

2. Balance contractor’s main office shall be located within 50 miles from the project site. Approved balance contractors are Felts-House Engineering, Ro-Bar Technical Services, and Building Systems Technologies. All other contractors must receive prior approval from the Engineer, in writing, before bidding the project.

3. The Mechanical Contractor shall provide assistance to the Balancing Contractor by identifying all installed mechanical systems and assisting access to all installed mechanical systems. All mechanical systems shall be completely operational and functional prior to the Balancing Contractor performing their specified work.

B. Air balancing:

1. Balancing of the air system shall consist of:
   a. Adjust all air volumes to the quantities shown, with allowable variation of plus 10, minus 10 percent.
   b. Record all system, zone, diffuser, grille, and register C.F.M. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Balancing Engineer shall work with the Contractor to set minimum & maximum CFM quantities for zone dampers, or zone dampers/heaters.
   c. Test and record all system static pressures, inlet and discharge, on all packaged units, fans, and terminal units. Vary total system air quantities by adjustment of fan speeds. Provide drive changes as necessary. Vary branch air quantities by damper regulation.
   d. Test and record motor full load amps and nameplate amps.
   e. Test and record entering and leaving temperatures at all coils.
   f. Adjust all automatically operated dampers, in cooperation with the Control Contractor, to the required settings. Adjust outside air automatic dampers, outside
air, return air, and exhaust dampers for design conditions within specified tolerances. Where modulating dampers or economizers are provided, take measurements at full return air, minimum outside air, and 100 percent outside air mode of operation.

g. Adjust diffusers and grilles for proper deflection, throw, and coverage. Eliminate drafts and excessive noise where possible.

h. Mark final positions of all balance dampers with a red felt pen.
i. Air systems shall be balanced in accordance with standard procedures and recognized practices of the Associated Air Balance Council, and the Testing Adjusting, and Balancing Bureau.

C. Quality Assurance:

1. The Balancing Contractor shall demonstrate to the Engineer of record, flow verification for at least 10% of the balanced devices as selected by the Engineer. If more than 25% of the tested devices do not meet the designed or balance report, then the entire system balance must be rebalanced.

D. Balance Reports:

1. Submit four copies of the air system balance report to the Architect/Engineer for evaluation and approval. Reports shall be on TABB/SMACNA forms that indicate information addressing each of the testing methods, readings, and adjustments.

3.7 CLEANING AND ADJUSTING:

A. Thoroughly clean all air conditioning units, air handling units, and all associated parts of the system at the completion of the work. Install new, clean air filters in all systems. Adjust all devices for proper operation and lubricate all equipment as required. Repaint any painted surface that has been damaged.

3.8 PROJECT CLOSEOUT:

A. Operations & Maintenance Manual:
The Contractor shall provide an operations and maintenance manual at least thirty days prior to completion of work. The manual shall be of the three ring binder type, entitled "Operations and Maintenance Manual", with the job name and year of completion also included. O & M manuals shall be submitted in a single package. Individual items will not be accepted independently unless approved by the Engineer. The manual shall include, as a minimum:

1. Maintenance instructions for all equipment, including lubrication requirements.

2. Equipment supplier’s names, addresses, and telephone numbers.

3. Equipment catalog cuts, ratings tables, model numbers, serial numbers, and accessories.

4. Parts numbers for all replaceable parts.

5. Air systems balance report as hereinbefore specified.

6. Control diagram or drawing and operation sequence.
7. Valve tagging chart as hereinbefore specified.
8. Filter chart listing unit callout, size of filters, and quantity of filters.
9. Guarantee letter as specified below.
10. Any additional information required to enable the Owner to properly maintain the building mechanical system.
11. Mechanical Equipment Start-up forms, which are included in this specification, if they are required.
12. After approval of the Operations and Maintenance Manual by the Architect/Engineer, the Contractor shall furnish two copies of the manual to the Owner.

B. Mechanical System Training Period:

1. After the mechanical system is completely installed and operational, the mechanical contractor shall provide a minimum of 1 hour of training and instruction time for the building Owner or his representative. During this period, the contractor shall instruct the Owner in the operation and maintenance of all parts of the mechanical system, using the O & M manual where applicable. The contractor shall provide a copy of the Project Owner Mechanical Systems Training Form (attached to this specification), with proper signatures, to the Engineer prior to substantial completion and insure that a copy is inserted into the project O & M manuals.

C. As-Built-Drawings:

1. Provide two sets of blue-line mechanical drawings showing the work as it was actually installed. The drawings shall indicate all departures from the contract drawings. Make all notations neat and legible, with red indelible pencil. At the completion of the work, these as-built drawings shall be signed and dated by the Mechanical Contractor, and returned to the Architect/Engineer.

D. Guarantee:

1. All work furnished under this section shall be guaranteed in writing to be free from defective work or materials for a period of one year after acceptance of the contract. All repairs or replacements because of defective materials or workmanship or noncompliance with code shall be provided without additional cost to the Owner. Contractor shall furnish a letter indicating above guarantee with space for date of acceptance and expiration of guarantee. Letter shall be included in O & M Manual.

END OF SECTION 230000
PART 1 - GENERAL

1.1 SCOPE

A. This section covers the work necessary for the heating, ventilating, and air conditioning system, complete. The HVAC General Requirements, Section 230000, is to be included as a part of this section of the specifications.

1.2 CODES & STANDARDS

A. The heating, ventilating, and air conditioning system shall be installed in accordance with the latest edition of the following codes and standards:

1. International Mechanical Code (IMC)
2. International Building Code (IBC)
3. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
4. National Fire Protection Association (NFPA)
5. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

PART 2 - PRODUCTS

2.1 AIR DISTRIBUTION

A. Ductwork:

1. Low pressure ductwork shall be fabricated from galvanized sheet metal, unless otherwise indicated. Construction requirements shall be in accordance with SMACNA - HVAC Duct Construction Standards, metal and flexible, latest edition. All sheet metal ductwork shall be sealed with McGill United Sheet Duct Sealer or equal, in accordance with the International Energy Compliance Code, latest edition. Adjustable (twist) elbows are not allowed. Low pressure ductwork shall be constructed to the following SMACNA static pressure standards:
   a. Supply air ductwork = 2" W.G.
   b. Return, Exhaust, Outside Air Intake ductwork = 1" W.G.

2. Low pressure ductwork which is exposed or located in mechanical rooms shall be fabricated from galvanized sheet metal. Construction requirements shall be in accordance with SMACNA HVAC Duct Construction Standards, metal and flexible, latest edition.
3. Low or medium pressure, double wall acoustically insulated ductwork shall have a minimum 1” insulation, & perforated metal lining, & shall be McGill Acousti-k27, Metaltec, or equal.

4. Ductwork penetrating protective elements of fire-rated corridor walls, with no openings into corridor, shall be constructed of minimum 26 gauge galvanized steel.

5. Flexible ducts shall be listed per UL-181 standard as Class 1 flexible, acoustical insulated air duct and complying with NFPA Standards 90A and 90B. Ducts shall be insulated with a minimum R-5 value, and shall have a maximum vapor transmission value of .05 perms. Ducts shall be factory made with and composed of: a PE liner duct permanently bonded to a coated spring steel wire helix. Duct shall be chlorine free and carry a ten-year warranty for the labor to replace the duct should there be a factory defect. Low permeability outer vapor barrier of fiberglass bidirectional reinforced metalized laminate shall complete the composite. Pressure rating shall be 6” w.g. and maximum length shall be 6 feet. Attach to duct take-off, diffuser, register, or grille only, with nylon or stainless steel duct clamp or tie. Flexmaster 1-M, Thermaflex M-KE (R6.0), or approved equal.

B. Duct Accessories:

1. Turning vanes shall be installed in all rectangular or square elbows. Vanes shall be installed in vane side rails. Vanes shall be single wall vanes, and be fabricated and installed per SMACNA standards.

2. Volume dampers shall be fabricated from galvanized steel in accordance with SMACNA standards. Dampers shall have a continuous galvanized steel shaft on ducts 13” diameter or larger, with damper regulators and end bearings. Dampers located above inaccessible ceilings (hard ceilings) shall be furnished with concealed ceiling damper regulators. Dampers shall be pressure rated equal to the design duct pressure rating. Dampers shall be provided at all diffuser and supply/exhaust grille takeoffs, regardless if indicated on the plans. Dampers are not required on the return air takeoffs unless specifically indicated.

3. Flexible connections shall be provided at all rotating fan equipment. Connectors shall be of fire, water, and weather resistant material.

4. Fire dampers shall be UL-labeled with frame, locking assembly, accordion style folded blades, and fusible link. Dampers shall be Style B with blades stored outside of the air stream. Provide duct inspection door at each fire damper. Minimum size shall be 8" x 8". Inspection door shall be provided with a steel frame with gasketing around periphery, and a hinged panel. Dampers located in moisture laden air conditions shall have all metal parts made of stainless steel.

5. Combination smoke and fire dampers are to be fusible link type with factory sleeve and electric operator located exterior to duct 120 V. operator to be spring return, fail closed with 212 degrees F link and UL label. Provide duct inspection door at each damper. Minimum size shall be 8” x 8”. Inspection door shall be provided with a steel frame with gasketing around periphery, and a hinged panel. Dampers located in moisture laden air conditions shall have all metal parts made of stainless steel. Belimo operators/actuators only.

6. A plastic flex elbow support by Flexible Technologies Inc., Titus FlexRight, or approved
equal, is required at all flex duct elbows supplying ceiling diffusers & return grilles. Elbow support shall be fully adjustable, or be of universal design, to support flexible diameters 6” – 16”, sized to fit flex duct. Elbow supports shall be UL rated for use in return air plenum spaces. At the Contractor’s option, a hard elbow may be used in lieu of a flexible elbow.

C. Diffusers, Registers, Louvers, Grilles, Weathercaps:

1. See Drawings for requirement.

D. Duct Cleanliness:

1. Ductwork Delivery To Site
   a. During ductwork being delivered from the premises of the manufacturer, care must be taken to prevent damage during transportation and off-loading.

2. Temporary Storage
   a. Job site duct material storage areas should be clean, dry, and located away from high dust generating processes such as masonry or tile cutters, cutoff saws, drywall sanding, mortar and plaster mixers, roof pitch kettles, portable electric generators, and main walkways that will be constantly broom swept. The general contractor should designate a suitable area for temporary storage.
   b. To prevent ductwork material damage from standing water, storage locations should include pallets or blocking to keep fabricated metal ductwork above the floor surface. If there is a risk of water runoff from above or dusty areas cannot be avoided, coverage should be used to protect stored materials.

3. Installation
   a. Before the installation of individual duct sections, they are to be inspected to insure that they are free from all debris.
   b. All ductwork risers must be covered to prevent the entry of debris into the duct.
   c. Downward facing and horizontal ductwork openings will not be required to be covered.
   d. Access covers shall be firmly fitted in position on completion of each section of the work. Open ends on completed ductwork and overnight work-in-progress shall be sealed.
   e. The working area should be clean and dry and protected from the elements.
   f. The internal surfaces of the uninsulated ductwork shall be wiped to remove excess dust immediately prior to installation.

2.2 INSULATION

A. General:

1. All insulation shall have composite fire and smoke hazard ratings, as tested by ASTM E-84, NFPA 255, and UL 723, not exceeding:

   Flame Spread   25
   Smoke Developed 50
B. Ductwork - External Insulation:

1. Insulation shall be fiberglass insulation with aluminum foil scrim kraft facing. All joints shall be taped with UL listed tape to provide a continuous vapor barrier. The following ducts shall be externally insulated:
   a. Supply ducts in unconditioned spaces (unless internally insulated)
   b. Return ducts in unconditioned spaces (unless internally insulated)
   c. Combustion air ducts
   d. Outside air intake ducts
   e. Exposed ductwork located within conditioned spaces shall not be externally insulated

1. Insulation thickness & "R" values shall be as follows:
   a. R-6 – ducts located in unconditioned spaces (such as above ceiling, but below roof insulation).
   b. R-8 – ducts located outside of the building's insulation envelope (such as above the attic insulation).

C. Ductwork - Internal Insulation:

1. Insulation shall be flexible fiberglass duct liner. Liner shall be attached with 100% coverage of manufacturers recommended adhesive and welded or mechanically fastened galvanized steel pins. All exposed edges of liner shall be coated with adhesive. Duct dimensions shown are net air side face-to-face of duct liner. The following ducts shall be internally insulated:
   a. Supply and Return ducts within 15'-0" of air handler
   b. Supply and Return ducts in mechanical rooms
   c. 15’-0” downstream of VAV terminal units.
   d. 15’-0” downstream of fan coil units.
   e. Ducts as indicated on plans

2. Insulation thickness & "R" values shall be as follows:
   a. R-6 – ducts located in unconditioned spaces (such as above ceiling, but below roof insulation, or buried ductwork)
   b. R-8 – ducts located outside of the building's insulation envelope (such as above the roof).

2.3 VIBRATION ISOLATION

A. General:

1. All rotating equipment and appurtenances connected to rotating equipment shall be vibration isolated from the supporting structure. No metal to metal contact will be permitted between fixed and floating parts. All metal isolators exposed to weather shall be hot dipped galvanized after fabrication. Piping connected to rotating equipment shall be hung with spring hangers for first 50 pipe diameters.

B. Floor Mounted Spring Isolators:

1. Isolators shall be free standing, laterally stable, and include acoustical friction pads and
leveling bolts. Isolators shall have a minimum ratio of spring diameter to operating spring height of 1.0 and an additional travel to solid equal to 50% of rated deflection.

C. Floor Mounted Neoprene Pads:

1. Isolators shall be neoprene waffle or combination neoprene and cork sandwich. Pads shall be sized and selected as per manufacturers loading requirements.

D. Spring Hangers:

1. Vibration hanger shall contain a spring and double deflection neoprene element in series. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional spring travel of 50 percent between design height and solid height. Spring shall permit a 15 degree angular misalignment without rubbing on hanger box.

2.4 SEISMIC SUPPORTS

A. All equipment, ductwork, and piping shall be seismically supported as required by the International Building Code, latest edition. Support details shall be as indicated on the Drawings.

2.5 CONTROL SYSTEM

A. General:

1. The Control Contractor shall be responsible for a complete and operable control system, including equipment, installation, and accessories required to perform the functions specified on the drawings. The Control Contractor shall supervise the installation of all control equipment and accessories and shall submit shop drawings of the proposed system for approval. The control system shall be an extension of the Automated Logic system by Clima-Tech of Boise.

2. The Control Contractor shall furnish and install all control conduit and wiring. All wiring shall be installed in EMT in accordance with the section Electrical. Provide plastic covered wires of not less than 18-gauge (16-gauge if longer than 50’), with at least one spare circuit at each control device. Control voltage shall not exceed 30 volts, except in starter pilot circuits.

3. The Mechanical Contractor shall be responsible for installing all control valves, water flow switches, temperature wells, control dampers, and related equipment which is furnished by the Control Contractor.

4. The control system shall be basically electric, with supplementary electronic devices as required.

5. The Control Contractor shall be a contractor who is regularly engaged in control system work, and can furnish a verified list of satisfactory installations of this type and size, for a period of 5 years or more.
B. Control Equipment and Accessories:

1. Control Dampers:
   a. All control dampers are to be furnished under this section, except those specified to be furnished with the air handling units. Damper blades shall be fabricated of 22-gauge galvanized sheet steel and frames shall be not less than 16-gauge galvanized steel. Blades shall be maximum 10 inches wide, 50 inches long, and shall be provided with neoprene gasketed edges and oilite bronze or nylon bearings. Dampers shall be ultra-low leakage, opposed blade type for proportional action and parallel blade type for two-position action. Leakage performance shall be maximum of 3 cfm per sq. ft. @ a pressure differential of 1” w.g. Provide damper operators for all motorized dampers and louvers. Belimo or approved equal. Submittals shall include leakage and pressure drop data for all control dampers. All outside air dampers shall fail closed.

2. Air Duct Smoke Detector:
   a. Smoke detector shall be products of combustion detector and shall be UL listed. The unit shall be designed for detection of combustion gases, fire, and smoke in air ducts in compliance with NFPA Pamphlet 90A. The sheet metal contractor shall provide a minimum 18”x18” hinged access door, in inaccessible ceilings, for each detector that is furnished. The sheet metal contractor is also responsible for providing all necessary transitions in the ductwork for mounting of the duct detector.

3. Thermostats:
   a. Thermostats shall be 7-day programmable type, with automatic changeover from heating to cooling, be provided with auxiliary contacts.
   b. Thermostats installed on exterior walls shall be mounted on an insulating block, or on foam insulation filled J-box.
   c. All thermostats shall have a mounting height of 46 inches, to the centerline of the device, unless otherwise noted on electrical drawings.

4. Equipment Control Schematics:
   a. See Drawings for schematics and sequence of operations.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. General:

1. Install all materials and equipment as shown and in strict accordance with the applicable codes for the State and/or city. Plans do not attempt to show exact details of all piping and ductwork, and no extra payment will be allowed for offsets required due to obstructions by other trades. All work shall be done in a neat and orderly fashion and left in a condition satisfactory to the Architect/Engineer.

2. All piping shall be run parallel or perpendicular to established building lines. Install piping so as to allow for expansion. Install all valves with stems horizontal or above. Install air
vents at all high points. Provide all piping which passes through walls, floors, or ceilings with standard weight pipe sleeves.

B. Insulation:

1. All piping insulation shall be applied over clean, dry surfaces after system has been pressure tested and any leaks corrected. Finished appearance of all insulation shall be smooth and continuous. Provide coat of insulating cement where needed to obtain this result.

2. Flexible duct insulation shall be secured to duct surface with 4-inch wide bands of adhesive applied on maximum 18-inch centers. Additional galvanized tie-wire support shall be furnished as required and recommended by the insulation manufacturer.

C. Diffusers, Registers and Grilles:

1. All diffusers, grilles, and registers shall be installed tight on their respective mounting surfaces and shall be accurately centered on ceiling tile, recesses, windows, or doors.

D. Ductwork:

1. All sheet metal work shall be done by qualified, experienced mechanics in accordance with the requirements of ASHRAE and the latest edition of the applicable SMACNA Manual. All ductwork shall be installed in a neat and orderly manner, and shall be adequately supported to prevent vibration or sagging. All sheet metal ductwork shall be sealed with United-Sheet Metal Duct Sealer or equal.

E. Air Conditioning Units:

1. Units shall be installed approximately where shown on the plans to provide access space for filter changing, motor, drive and bearing servicing, and fan shaft and coil removing. Pipe drain pan connection through a running trap to floor drain. Unit shall not be operated until filters are installed. Isolate sheet metal ducts from all fans with flexible connectors.

F. Condensing Units/Heat Pumps:

1. Units located on flat rooftops shall be provided with Miro Industries Model HD, or equal, heavy duty galvanized roof support with adjustable legs, sized 6 inches larger, in each direction, than equipment footprint.

END OF SECTION 230100
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1.1 CONDITIONS AND REQUIREMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
   B. Provisions of this Section shall apply to all Sections of Division 26, 27, and 28.

1.2 SCOPE OF WORK
   A. Furnish and install all materials and equipment and provide all labor required and necessary to complete the work shown on the drawings and/or specified in all Sections of Division 26 and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete installation, including all accessories required for testing the system. It is the intent of the drawings and specifications that all systems be complete and ready for operation.

1.3 CODE COMPLIANCE
   A. All work and materials shall comply with the latest rules, codes and regulations, including, but not limited to, the following:
      1. Occupational Safety and Health Act Standards (OSHA)
      2. NFPA #70 – National Electric Code (NEC)
      3. ADA Standards – Americans with Disabilities Act
      5. NECA – Standard of Installation
      7. International Fire Code
      9. NFPA #72 – Fire Code
     11. All other applicable Federal, State and local laws and regulations.
   B. Work to be executed and inspected in accordance with local codes and ordinances. Permits, fees or charges for inspection or other services shall be paid for by the contractor. Local codes and ordinances are to be considered as minimum requirements and must be properly executed without expense to the owner; but do not relieve the contractor from work shown that exceeds minimum requirements.

1.4 CONDITIONS AT SITE
A. Visit to site is recommended of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other service that are damaged as a result of this work shall be promptly repaired at no expense to the owner to the complete satisfaction of the owner.

1.5 DRAWINGS AND SPECIFICATIONS

A. All drawings and all specifications shall be considered as a whole and work of this Division shown anywhere therein shall be furnished under this Division.

B. Drawings are diagrammatic and indicate the general arrangement of equipment and wiring. Most direct routing of conduits and wiring is not assured. Exact requirements shall be governed by architectural, structural and mechanical conditions of the job. Consult all other drawings in preparation of the bid. Extra lengths of wiring or addition of pull or junction boxes, etc., necessitated by such conditions shall be included in the bid. Check all information and report any apparent discrepancies before submitting bid.

C. Change to location, type, function, brand name, finish, etc., shall not be made without permission of engineer.

D. Some equipment is specifically designated on the drawings. It is not the intent to sole source any item unless explicitly stated. Items have been specified based upon design requirements. All bidders are encouraged to submit products for approval. Prior approval must be obtained as required by these contract documents. Bids submitted with non-approved items will be considered invalid and bidders will be held to provide approved materials at no additional cost to the owner. Submittals received by the engineer after award of contract on non-approved equipment will not be reviewed nor will they be returned.

E. Where conflicting direction is given within the specifications and drawings, the contractor shall include the most expensive option in the bid.

1.6 SAFETY AND INDEMNITY

A. Safety: The contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours.

B. No act, service, drawing review or construction review by the owner is intended to include review of the adequacy of the contractor’s safety measures in, on, or near the construction site.

1.7 CONSTRUCTION OBSERVATION BY THE ENGINEER

A. Prior to covering: any major portion of the materials installed under this section, notify the engineer so that an observation can be made. Notification shall be made at least three (3) working days in advance of the date the items will be covered.
1.8 INSTRUCTION OF OWNER’S PERSONNEL

A. The contractor shall conduct an on-site instructional tour of the entire project. The personnel designated by the owner shall be instructed in: operation of all electrical systems, trouble-shooting procedures, preventative maintenance procedures, uses of Operation and Maintenance manuals, relamping and cleaning of lighting fixtures and operation of all special systems.

B. Contractor will include in his bid 8 hours of instruction time to be held at the project location after substantial completion for instruction of owner’s personnel. Coordinate time and number of owner personnel to be present and provide schedule to engineer.

1.9 PROJECT COMPLETION

A. Upon completion of all work and operational checks on all systems, the contractor shall request that a final construction observation be performed.

B. The engineer shall compile a punch list of items to be completed or corrected. The contractor shall notify the engineer upon completion of the items.

1.10 GUARANTEE

A. All work under this section shall be guaranteed in writing to be free of defective work, materials, or parts for a period of one (1) year, except lamps which shall be guaranteed for ninety (90) days, after final acceptance of the work under this contract or the period indicated under the Division 1 specifications whichever is longer.

B. Repair, revision or replacement of any and all defects, failure or inoperativeness shall be done by the contractor at no cost to the owner.

PART 2 - PRODUCTS

2.1 MATERIAL APPROVAL

A. The design, manufacturer and testing of electrical equipment and materials shall conform to or exceed latest applicable NEMA, IEEE or ANSI standards.

B. All materials must be new, unless noted otherwise, and UL listed. Materials that are not covered by UL testing standards shall be tested and approved by an independent testing laboratory or a governmental agency, which laboratory shall be acceptable to the owner and code enforcing agency.

2.2 SHOP DRAWINGS AND MATERIALS LIST

A. Submit shop drawings and materials lists as specified for review. Seven (7) copies, unless noted otherwise under Division 1, of submittals shall be presented to the architect/engineer.

2.3 OPERATION AND MAINTENANCE MANUALS
A. Submit four (4) sets, unless noted otherwise under Division 1, of the Operation and Maintenance Manuals of all Division 26 equipment to architect/engineer.

2.4 RECORD DRAWINGS

A. Submit record drawings to owner.

2.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials in a manner to prevent damage.

B. Protect equipment from weather and dampness.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND CONTRACTOR’S QUALIFICATIONS

A. Only quality workmanship will be accepted. Haphazard or poor installation practice will be cause for rejection of work.

B. Provide experienced foreman with a minimum of three years experience working on this type of building placed in charge of this work at all times.

3.2 COORDINATION

A. Coordinate work with other trades to avoid conflict and to provide correct rough-in and connection for equipment furnished under trades that require electrical connections. Inform contractors of other trades of the required access to and clearances around electrical equipment to maintain serviceability and code compliance.

B. Verify equipment dimensions and requirements with provisions specified under this Section. Check actual job conditions before fabricating work. Report necessary changes in time to prevent needless work. Changes or additions subject to additional compensation, which are made without the authorization of the owner, shall be at contractor’s risk and expense.

3.3 MANUFACTURER’S INSTRUCTIONS

A. All installations are to be made in accordance with manufacturer’s recommendations. A copy of such recommendations shall at all times be kept in the job superintendent’s office and shall be available to the engineer.

B. Follow manufacturer’s instructions where they cover points not specifically indicated on drawings and specifications. If they are in conflict with the drawings and specifications obtain clarification from the engineer before starting work.
3.4 QUALITY ASSURANCE

A. The contractor shall insure that all workmanship, all materials employed, all required equipment and the manner and method of installation conforms to accepted construction and engineering practices, and that each piece of equipment is in satisfactory working condition to satisfactorily perform its functional operation.

B. Provide quality assurance tests and operational check on all components of the electrical distribution system, all lighting fixtures, and special systems.

3.5 CUTTING AND PATCHING

A. Perform all cutting and fittings required for work of this section in rough construction of the building.

B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials.

C. No joists, beams, girders or columns shall be cut by any contractor without obtaining written permission from the architect/engineer.

END OF SECTION 260500
SECTION 260502 – SHORT-CIRCUIT/ ARC FLASH HAZARD ANALYSIS

PART 1: GENERAL

1.1 SCOPE

A. The contractor shall furnish short-circuit as prepared by the electrical equipment manufacturer or a professional licensed engineer.

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in NFPA 70E-Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in the current version of NFPA70E.

C. The scope of the studies shall include all distribution equipment supplied under this contract.

1.2 RELATED DOCUMENTS

A. 262416 – Panelboards

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis

B. American National Standards Institute (ANSI):

1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

C. The National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code, latest edition
2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.4 SUBMITTALS FOR REVIEW/APPROVAL

A. The short-circuit shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from the engineer may be obtained for preliminary submittal of sufficient study data to ensure that the selection of device and characteristics will be satisfactory.

1.5 SUBMITTALS FOR CONSTRUCTION

A. The results of the short-circuit, arc flash hazard analysis studies shall be summarized in a final report. Five (5) bound copies of the complete final report shall be submitted. For large system studies. Additional copies of the short-circuit input and output data, where required, shall be provided on CD in PDF format.

B. The report shall include the following sections:

1. Executive Summary
2. Descriptions, purpose, basis and scope of the study
3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties
4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection
5. Fault current calculations including a definition of terms and guide for interpretation of the computer printout
6. Details of the incident energy and flash protection boundary calculations
7. Recommendations for system improvements, where needed
8. One-line diagram
9. Arc flash labels shall be provided in hard copy.

1.6 QUALIFICATIONS

A. The short-circuit, and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

1.7 COMPUTER ANALYSIS SOFTWARE

A. The studies shall be performed using the latest revision of:

1. SKM Systems Analysis Power*Tools for Windows (PTW) software program
2. Easy Power
3. Or Pre-Approved Software.

PART 2: PRODUCT

2.1 STUDIES

A. Contractor to furnish short-circuit as prepared by equipment manufacturer or an approved engineering firm.

B. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

2.2 DATA COLLECTION

A. Contractor shall furnish all data as required by the power system studies. The Engineer performing the short-circuit, and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Source combination may include present and future motors and generators.

C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.

D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.3 SHORT-CIRCUIT STUDY


B. Transformer design impedances shall be used when test impedances are not available.

C. Provide the following:

1. Calculation methods and assumptions
2. Selected base per unit quantities
3. One-line diagram of the system being evaluated
4. Source impedance data, including electric utility system and motor fault contribution characteristics
5. Tabulations of calculated quantities
6. Results, conclusions, and recommendations.

D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:
1. Electric utility’s supply termination point
2. Incoming switchgear
3. Low voltage switchgear
4. Motor control centers
5. Branch circuit panelboards
6. Other significant locations throughout the system.

E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

F. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short circuit ratings
2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses
3. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.4 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

B. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.

C. The Arc-Flash Hazard Analysis shall include all significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 75KkVA where work could be performed on energized parts.

D. Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm^2.

E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.

F. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable.
G. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond 3-5 cycles.
2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from permanent magnet generators will typically decay from 10 per unit to 3 per unit after 10 cycles).

H. For each equipment location with a separately enclosed main device (where there is adequate separation between the line side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.

I. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.

J. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

K. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

2.6 REPORT SECTIONS

A. Input data shall include, but not be limited to the following:

1. Feeder input data including feeder type (cable or bus), size, length, number per phase, conduit type (magnetic or non-magnetic) and conductor material (copper or aluminum).
2. Transformer input data, including winding connections, secondary neutral-ground connection, primary and secondary voltage ratings, kVA rating, impedance, % taps and phase shift.
3. Reactor data, including voltage rating, and impedance.
4. Generation contribution data, (synchronous generators and Utility), including short-circuit reactance (X^"d"), rated MVA, rated voltage, three-phase and single line-ground contribution (for Utility sources) and X/R ratio.
5. Motor contribution data (induction motors and synchronous motors), including short-circuit reactance, rated horsepower or kVA, rated voltage, and X/R ratio.

B. Short-Circuit Output Data shall include, but not be limited to the following reports:

1. Low Voltage Fault Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
   a. Voltage
b. Calculated fault current magnitude and angle
c. Fault point X/R ratio
d. Equivalent impedance

2. Momentary Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
   a. Voltage
   b. Calculated symmetrical fault current magnitude and angle
   c. Fault point X/R ratio
   d. Calculated asymmetrical fault currents
      1. Based on fault point X/R ratio
      2. Based on calculated symmetrical value multiplied by 1.6
      3. Based on calculated symmetrical value multiplied by 2.7
   e. Equivalent impedance

3. Interrupting Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:
   a. Voltage
   b. Calculated symmetrical fault current magnitude and angle
   c. Fault point X/R ratio
   d. No AC Decrement (NACD) Ratio
   e. Equivalent impedance
   f. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a symmetrical basis
   g. Multiplying factors for 2, 3, 5 and 8 cycle circuit breakers rated on a total basis

C. Incident energy and flash protection boundary calculations
   1. Arcing fault magnitude
   2. Protective device clearing time
   3. Duration of arc
   4. Arc flash boundary
   5. Working distance
   6. Incident energy
   7. Hazard Risk Category
   8. Recommendations for arc flash energy reduction

PART 3 EXECUTION

3.1. FIELD ADJUSTMENT

A. Make minor modifications to equipment as required to accomplish conformance with short circuit.

B. Notify Owner in writing of any required major equipment modifications.

3.2. ARC FLASH WARNING LABELS
A. The contractor of the Arc Flash Hazard Analysis shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed.

B. All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the owner and after any system changes, upgrades or modifications have been incorporated in the system.

C. The label shall include the following information, at a minimum:
   1. Location designation
   2. Nominal voltage
   3. Flash protection boundary
   4. Hazard risk category
   5. Incident energy
   6. Working distance
   7. Engineering report number, revision number and issue date.

D. Labels shall be machine printed, with no field markings.

E. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.
   1. For each 600, 480 and applicable 208 volt panelboard, one arc flash label shall be provided.
   2. For each motor control center, one arc flash label shall be provided.
   3. For each low voltage switchboard, one arc flash label shall be provided.
   4. For each switchgear, one flash label shall be provided.
   5. For medium voltage switches one arc flash label shall be provided.

F. Labels shall be installed by the engineering service division of the equipment manufacture or the approved testing agencies listed in the related testing section(s).

3.3. ARC FLASH TRAINING

A. The contractor of the Arc Flash Analysis shall train the owner’s qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours).

END OF SECTION 260502
SECTION 260519 - CONDUCTORS AND CABLES

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS
A. Submit shop drawings and product data.

1.4 COORDINATION
A. Coordinate layout and installation of cables with other installations.
B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by the owner.

PART 2 - PRODUCTS

2.1 BUILDING WIRES AND CABLES
A. Conductors: Stranded, copper, 600 volt insulation, type THHN/THWN, THHN/THWN-2, XHHN/XHHW.
B. Conductors:
   1. Solid or stranded for No. 10 and smaller, stranded for No. 8 and larger, copper, 600 volt insulation, type THHN/THWN. Aluminum conductors not allowed unless noted otherwise.
   2. Insulation Types: THWN-2 for underground, THWN for wet locations, THHN for dry locations; XHHN/XHHW for GFI branch circuits and feeders fed from GFCI breakers.
C. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
   1. Phase A: Black.
   2. Phase B: Red.
3. Phase C: Blue.
5. Ground: Green.
6. Isolated ground: Green with yellow tracer.

D. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Brown.
2. Phase B: Orange.
3. Phase C: Yellow.
5. Ground: Green.

E. Wire connectors and splices: units of size, ampacity rating, material, type and class suitable for service indicated.

F. Signal and communication circuits:

1. Special cables as indicated on the drawings.
2. Conductors for general use: stranded copper conductor, #16 AWG minimum, with THWN-2 insulation for underground, THWN for wet locations and THHN insulation for dry locations.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Use no wire smaller than #12 AWG for power and lighting circuits and no smaller than #18 AWG for control wiring.

C. The contractor is responsible for upsizing conductor sizes to ensure the maximum voltage drop of any branch circuit does not exceed 3%. For reference, use No. 10 AWG conductor for 20 Amp, 120 volt branch circuits longer than 75 feet, and for 20 Amp, 277 volt branch circuits longer than 200 feet.

D. Place an equal number of conductors for each phase of a circuit in the same raceway or conduit.

E. Splice only in junction or outlet boxes.

F. Neatly train or lace wiring inside boxes, equipment, and panelboards.

G. Make conductor lengths for parallel circuits equal.

H. Provide a separate neutral conductor for each ungrounded conductor. Ungrounded conductors may share a neutral when all of the following conditions are met:
1. The ungrounded conductors are connected to a multi-pole breaker or breakers that are clipped together with a UL listed means that provide a common trip.
2. The ungrounded conductors contained in the same conduit or raceway.
3. The ungrounded conductors all originate from a separate and unique phase bus in the panel.

3.2 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions, and the “National Electrical Installation Standards” by NECA.
B. Remove existing wires from raceway before pulling in new wires and cables.
C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
D. Use pulling means; including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.
E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
F. Support cables above accessible ceilings; do not rest on ceiling tiles. Do not fasten cables to ceiling support wires. Use cable ties to support cables from structure.

3.3 CONNECTIONS

A. Conductor Splices: Keep to minimum.
B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
C. Use splice and tap connectors compatible with conductor material.
D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.
G. Terminate spare conductors with electrical tape.

3.4 LABELING

A. Provide Brady wire markers or equivalent on all conductors. All wire shall be labeled in each box and panel with the circuit number and panel identification.
3.5 FIELD QUALITY CONTROL

A. Inspect wire and cable for physical damage.

B. Perform continuity testing on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION 260519
SECTION 260526 - GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including Fixed Price Construction Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SYSTEM DESCRIPTION
A. Ground the electrical service system neutral at service entrance equipment to concrete encased electrode, metal underground water pipe, and effectively grounded metal frame of building.
B. Ground each separately-derived system neutral to nearest effectively grounded metal structural frame of building or point of service entrance ground.
C. Provide communications system grounding conductor to point of service entrance ground.
D. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductors in raceways and cables, receptacle ground connectors, and plumbing systems.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS
A. For insulated conductors, comply with Section 260519 - Conductors and Cables.
B. Material: Copper.
C. Equipment Grounding Conductors: Insulated with green-colored insulation. Where green insulation is not available, on larger sizes, black insulation shall be used and suitably identified with green tape at each junction box or device enclosure.
D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow tracer. Where not available, green and yellow tape at each junction box or device enclosure.
E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
F. Bare Copper Conductors: Medium hard drawn copper conductor, stranded, sized as shown on the drawings.

G. Hardware: Bolts, nuts and washers shall be bronze; cadmium plated steel or other non-corrosive material, approved for the purpose.

H. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.2 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

D. Below grade compression fittings: Thomas & Betts, Series 52000, 53000, and 54000 or equivalent.

E. Use connector and sealant approved for purpose on all below grade clamp or compression type connections.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

   1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

F. Underground Grounding Conductors: Use copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.

3.2 EQUIPMENT GROUNDING CONDUCTORS
A. Comply with NEC Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NEC are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:
   1. Feeders and branch circuits.
   2. Lighting circuits.
   3. Receptacle circuits.
   5. Three-phase motor and appliance branch circuits.
   6. Flexible raceway runs.

D. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

F. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways bonded to outlet or equipment, sized per Section 250 of the NEC.

G. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
   2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

H. Provide green insulated ground conductor to exterior post light standards.

I. Provide grounding and bonding at pad-mounted transformer in accordance with Section 261200.

3.3 INSTALLATION

A. Ground Rods: Where indicated, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
   1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
   2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, unless otherwise indicated. Make connections without exposing steel or damaging copper coating.
B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by
connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 SYSTEM NEUTRAL GROUND

A. Ground the neutral conductor of each transformer or generator to limit the maximum potential above ground due to normal operating voltage and limit the voltage level due to abnormal conditions.

B. Ground generators or transformers with secondary voltage 600 volt or less as follows:

1. 3 phase, 4 wire Wye connected: ground neutral point

C. For transformers 75 kVA or smaller with primary voltage 480 volt or less the primary equipment ground conductor may be used for grounding the secondary neutral provided it is adequately sized in accordance with NEC system ground conductor size.

3.6 EQUIPMENT GROUND

A. Ground non-current carrying metal parts of electrical equipment enclosures, frames, conductor raceways or cable trays to provide a low impedance path for line-to-ground fault current and to bond all non-current carrying metal parts together. Install a grounding conductor in each raceway system. Equipment grounding conductor shall be electrically and mechanically continuous from the electrical circuit source to the equipment to be grounded. Size grounding conductors per NEC 250 unless otherwise shown on the drawings.

B. Install metal raceway couplings, fittings, and terminations secure and tight to ensure good grounding continuity. Provide grounding conductor sized per NEC through all raceway and conduit systems.

C. Lighting fixtures shall be securely connected to equipment grounding conductors.

D. Motors shall be connected to equipment ground conductors with a bolted solderless lug connection on the metal frame.

3.7 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION 260526
SECTION 260533 - RACEWAYS AND BOXES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS
   A. EMT: Electrical metallic tubing.
   B. FMC: Flexible metal conduit.
   C. IMC: Intermediate metal conduit.
   D. LFMC: Liquidtight flexible metal conduit.
   E. RMC: Rigid metal conduit.
   F. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS
   A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 COORDINATION
   A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING
   A. Rigid Steel Conduit: ANSI C80.1.
B. IMC: ANSI C80.6.

C. PVC coated Steel Conduit and Fittings: NEMA RN 1; rigid steel conduit with external 40 mil PVC coating and internal two mil urethane coating.

D. EMT and Fittings: ANSI C80.3. Fittings: Set-screw type.

E. FMC: Zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.2 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 PVC. Fittings: NEMA TC 3; match to conduit and material.

2.3 METAL WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Finish: Manufacturer's standard enamel finish.

2.4 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.5 FLOOR BOXES

A. Floor Boxes: Cast metal, fully adjustable, rectangular, unless otherwise specified.

2.6 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.7 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, 3R, or 4, with continuous hinge cover and flush latch, key operable.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

2.8 J-HOOKS

A. J-hooks: Steel, rated for indoor use in non-corrosive environments. J-hooks shall be rated to support Category 5e cable.

B. Fittings and Support Bodies: Manufacturer’s recommended fittings including side mount flange clips, bottom mount flange clips, beam clamp, rod and flange clip, C & Z purlin clip, and all other components and assemblies to make the system work.

C. Acceptable Product: Caddy CableCat Hanging System, 1-5/16” and 2” hooks, or approved equal

D. Acceptable Manufacturer: Erico Fastening Products or approved equal.

E. J-hook Supports: Manufacturer’s recommended fastening devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Indoors: Use the following wiring methods:

1. Exposed: EMT or “Wiremold” metallic raceways or equal.
2. Exposed in public areas: “Wiremold” metallic raceways or equal. Use of exposed raceways in public areas must be approved by the architect prior to installation for each location. Use of exposed EMT in areas visible to the public is not allowed unless specifically approved by the architect prior to installation. Replacement of unapproved installations of exposed raceways will be at the expense of the contractor if deemed necessary by the architect or engineer.
3. Concealed: EMT, MC-Cable, Hospital Grade MC-Cable for all Patient Care Areas. Note:MC-Cable is not approved for “homeruns”
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
5. Damp or Wet Locations: Rigid steel conduit.
6. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
   a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 1/2-inch trade size. 3/4-inch minimum for “homeruns”.

C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

D. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

H. Use temporary closures to prevent foreign matter from entering raceways.

I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

M. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

   1. Run parallel or banked raceways together, on common supports where practical.
   2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

O. Join raceways with fittings designed and approved for the purpose and make joints tight.

   1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
   2. Use insulating bushings to protect conductors.

P. Tighten set screws of threadless fittings with suitable tools.
Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

S. Install pull wires in empty raceways. Utilize polyester line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

T. Telephone and Signal System Raceways: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

U. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
   2. Where conduit pass from the interior to the exterior of a building.
   3. Where otherwise required by NEC.

V. Apply firestopping to cable and raceway penetrations of fire-rated floor, ceiling, and wall assemblies to achieve fire-resistance rating of the assembly. Boxes installed in fire-rated floor, ceiling, and wall assemblies shall result in no larger than a 16 square-inch penetration in the fire-rated wall surface and the quantity of penetrations shall not be greater than 100 square-inches for every 100 square feet of fire-rated wall area. Where boxes are located on both sides of a fire-rated wall, the boxes shall have a minimum of a 24” horizontal spacing, where a 24” horizontal spacing cannot be achieved, furnish and install listed fire-rated putty on the boxes as required by the IBC.

W. Route conduit through roof openings for piping and ductwork where possible; otherwise, install roof penetrations in accordance with roofing system requirements. Coordinate with roofing installer.

X. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

Y. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

Z. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.
AA. Conduits shall not be routed on or above the roof without prior approval from the Engineer. Instead, the branch circuits shall be routed at the structure level below the roof to feed roof-top equipment. When approval is granted to route conduits on or above the roof, the conduits shall be strapped to COOPER industries DB series support blocks at intervals not exceeding NEC requirements. The conduits shall not be rested directly on the roof. It shall be permissible to penetrate the roof adjacent mechanical or electrical equipment to power that respective equipment.

3.4 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers, at least every 8 feet.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards; disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit. Perform fastening according to the following unless other fastening methods are indicated:

1. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
2. New Concrete: Concrete inserts with machine screws and bolts.
3. Existing Concrete: Expansion bolts.
4. Steel: Spring-tension clamps on steel.
5. Light Steel: Sheet-metal screws.
6. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

N. Do not drill structural steel members.

O. All supports and attachments shall meet project seismic zone requirements.

3.5 BOX INSTALLATION

A. Do not install boxes back-to-back in walls.

B. Locate boxes in masonry walls to require cutting of masonry unit edge only. Coordinate masonry cutting to achieve neat openings for boxes.

C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches of box.

E. Use 4” boxes with multiple-gang mudring where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in walls without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

H. Position outlets to locate lighting fixtures as shown on reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.

J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud walls, and adjustable steel channel fasteners for flush ceiling outlet boxes.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. For boxes installed in metal construction, use rigid support metal bar hangers or metal bar fastened to two studs or with metal screws to metal studs.

M. Set floor boxes level and adjust to finished floor surface.
N. Set floor boxes level and trim after installation to fit flush to finished floor surface.

O. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

P. Locate pull and junction boxes above accessible ceilings or in unfinished areas. Support pull and junction boxes independent of conduit.

Q. Minimum box size to be 4” square by 2 1/8” deep.

3.6 LABELING

A. Label coverplate of all pull and junction boxes by system served. Indicate panel circuits for power and lighting boxes.

3.7 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 260533
SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes time switches, photoelectric relays, occupancy sensors, and multi-pole lighting relays and contactors.
   B. Related Sections include the following:
      1. Section 262726 - Wiring Devices for wall-box dimmers and manual light switches.

1.3 SUBMITTALS
   A. Submit shop drawings and product data, including all wiring diagrams.

PART 2 - PRODUCTS

2.1 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

2.2 PHOTOELECTRIC RELAYS
   A. Description: Solid state, with single-pole, double-throw dry contacts rated to operate connected relay or contactor coils or microprocessor input, and complying with UL 773A.
   B. Light-Level Monitoring Range: 0 to 3500 fc, with an adjustment for turn-on/turn-off levels.
   C. Time Delay: Prevents false operation.
   D. Outdoor Sealed Units: Weather tight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.

2.3 OCCUPANCY SENSORS
A. Occupancy sensors indicated on the plans are to establish room controls and sensor quantities. The contractor is to verify sensor placement with the local manufacturer’s representative or the manufacturer to ensure proper coverage and functionally of the specific sensor(s) installed. The contractor is to return and make any adjustments necessary to the occupancy sensor settings and/or placement needed to maintain proper functionality within 30 days after the owner/tenant takes occupancy of the project.

B. Lighting control system shall include all occupancy sensors, power packs, and control wiring required to form a complete system.

C. All occupancy sensors shall be dual/multi technology, manufactured by Unenco, Wattstopper, Lightolier Controls, Sensor Switch, or pre-approved equal unless otherwise noted.

D. Ceiling and Wall Mount Units: Shall utilize dual/multi technology detection methods. Unit receives control power from a separately mounted auxiliary power and control unit, and operates power switching contacts in that unit.

E. Switch-Box-Mounting Units: Shall utilize dual/multi technology detection methods. Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts. Unit is to have integral manual controls and is to be mounted at standard switch height.

F. Operation: Turns lights on when room or covered area is occupied and off when unoccupied, unless otherwise indicated.

   1. Time Delay for Turning Lights Off: Adjustable over a range from 1 to 30 minutes, minimum. Time delay to be set at 20 minutes unless otherwise directed. Contractor shall verify time delay with the owner/tenant prior to final occupancy.
   2. Manual Override Switch: Where indicated on drawings; turns lights off manually regardless of elapsed time delay.
   3. Sensor shall be located and/or adjusted to detect occupancy within 1-foot of entry into room or area controlled by the occupancy sensor.

G. Auxiliary Power and Control Units: As follows:

   1. Relays rated for a minimum of 20-A normal ballast load.
   2. Sensor Power Supply: Rated to supply the number of connected sensors.
   3. Relays shall have an auxiliary contact(s) for integration with HVAC or other building control systems.

H. Passive-Infrared Type: Detects occupancy by a combination of heat and movement in zone of coverage.

I. Ultrasonic Type: Emits a beam of ultrasonic energy and detects occupancy through use of Doppler's principle in discerning movement in zone of coverage by sensing a change in pattern of reflected ultrasonic energy. Ultrasonic frequency shall be 25 Khz or greater and sensor shall be temperature and humidity resistant.

J. Dual-Technology Type: Uses a combination of passive-infrared and ultrasonic or microphonic detection methods to distinguish between occupied and unoccupied conditions.
for area covered. Particular technology or combination of technologies that controls each function (ON or OFF) is selectable in the field by operating controls on unit.

K. All sensors shall be capable of operating normally with electronic ballast and compact fluorescent systems.

L. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

M. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls shall be recessed to limit tampering.

N. In the event of failure, a bypass manual “override on” feature shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly. The override feature shall be designed for use by building maintenance personnel and shall not be readily accessible by building occupants.

O. All sensors shall provide an LED indication light to verify that motion is being detected and that the unit is working.

P. All sensors shall have no leakage current in OFF mode and shall have voltage drop protection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment level and plumb and according to manufacturer's written instructions.

3.2 CONTROL WIRING INSTALLATION

A. Install wiring between sensing and control devices according to manufacturer's written instructions.

B. Wiring Method: Install all wiring in raceways.

C. Bundle, train, and support wiring in enclosures.

D. Ground equipment.

E. Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.3 IDENTIFICATION

A. Provide Brady wire markers or equivalent on all conductors.
3.4 FIELD QUALITY CONTROL

A. Inspect control components for defects and physical damage.

B. Verify settings of photoelectric devices with photometer.

C. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
   1. Continuity tests of circuits.
   2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.

D. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.

E. The Lighting Control Panel shall be tested and listed under the UL 906 Energy Management Equipment Standards.

3.5 CLEANING

A. Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

END OF SECTION 260923
SECTION 262200 - DRY-TYPE TRANSFORMERS (1000 V AND LESS)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes dry-type distribution and specialty transformers rated 1000 V and less.

1.3 SUBMITTALS

A. Product Data: Include data on features, components, ratings, and performance for each type of transformer specified. Include dimensioned plans, sections, and elevation views. Show minimum clearances and installed devices and features.

B. Wiring Diagrams: Detail wiring and identify terminals for tap changing and connecting field-installed wiring.

C. Factory Test Reports: Copy of manufacturer's design and routine factory tests required by referenced standards.

D. Sound-Level Test Reports: Copy of manufacturer's sound-level tests applicable to equipment for this project.

E. Maintenance Data: For transformers.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide transformers specified in this section that are listed and labeled as defined in the NEC.

B. Equipment shall conform or exceed requirements of NEMA, ANSI Standard C89.2 for dry-type transformers for general applications.

C. Comply with the NEC.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturers:

2. GE Electrical Distribution & Control.
3. Square D; Groupe Schneider.
4. Siemens
5. Or approved equal.

2.2 TRANSFORMERS, GENERAL

A. Description: Factory-assembled and -tested, air-cooled units of types specified, designed for 60-Hz service.

B. Cores: Grain-oriented, nonaging silicon steel.

C. Coils: Continuous windings without splices, except for taps.

D. Internal Coil Connections: Brazed or pressure type.

E. Enclosure: Class complies with NEMA 250 for the environment in which installed.

F. Low-Sound-Level Units: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

2.3 GENERAL-PURPOSE DISTRIBUTION AND POWER TRANSFORMERS

A. Comply with NEMA ST 20 and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Windings: One coil per phase in primary and secondary.

D. Electrical ratings:

1. Primary winding voltage: 480 volts, 3 phase, delta.
2. Secondary winding voltage: 120/208 volts, 3 phase grounded wye.
3. KVA rating: As indicated on drawings.

E. Enclosure: Indoor, ventilated.

F. Temperature classification:

1. Winding temperature rise shall be 150 degrees C in accordance with UL specification 506 with insulation Class 220 degree Celsius.

G. Load rating:

1. Transformer shall be capable of operating at 100% of nameplate rating continuously while in an ambient temperature not exceeding 40 degrees C.
2. Transformer shall meet the daily overload requirements of ANSI Standard C57.96.
H. Taps: For transformers 3 kVA and larger, full-capacity taps in high-voltage windings are as follows:

1. Taps, 3 through 10 kVA: Two 5-percent taps below rated high voltage.
2. Taps, 15 through 500 kVA: Six 2.5-percent taps, 2 above and 4 below rated high voltage.
3. Taps, 750 kVA and Above: Four 2.5-percent taps, 2 above and 2 below rated high voltage.

I. K-Factor Rating: Transformers indicated to be K-factor rated are listed to comply with UL 1561 requirements for nonsinusoidal load current handling capability to the degree defined by the designated K-factor.

1. Transformer design prevents overheating when carrying full load with harmonic content corresponding to the designated K-factor.
2. Nameplate states the designated K-factor of the transformer.

J. Vibration Isolation:

1. Provide neoprene rubber pads to isolate core and coil assembly from transformer enclosure.

K. Wall-Mounting Brackets: Manufacturer's standard brackets for transformers up to 75 kVA.

2.4 CONTROL AND SIGNAL TRANSFORMERS

A. Units comply with NEMA ST 1 and are listed and labeled as complying with UL 506.

B. Ratings: Continuous duty. If rating is not indicated, provide capacity exceeding peak load by 50 percent minimum.

C. Description: Self-cooled, 2 windings.

2.5 FINISHES

A. Indoor Units: Manufacturer's standard paint over corrosion-resistant pretreatment and primer.

2.6 SOURCE QUALITY CONTROL

A. Factory Tests: Design and routine tests comply with referenced standards.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this project if specified sound levels are below standard ratings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with safety requirements of IEEE C2.

B. Arrange equipment to provide adequate spacing for access and for circulation of cooling air.
C. Anchor transformer securely with minimum ½” diameter bolts. Strength of bolts used to secure the transformer shall be sufficient to resist shear and uplift produced by a force equal to one half of the equipment mass applied horizontally at the center of gravity.

D. Provide 1” thick resiliency pads to isolate transformer from floor or platform, Korfund “Elasto Rib” or equal.

E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

F. The grounding conductor for each transformer shall be routed back to the Main Grounding Bar used for the building ground system.

3.2 GROUNDING

A. Separately Derived Systems: Comply with the NEC requirements for connecting to grounding electrodes and for bonding to metallic piping near the transformer.

B. Comply with Section 260526 - Grounding for materials and installation requirements.

3.3 CONNECTIONS

A. Use flexible conduits at least 24” long for electrical connections.

3.4 IDENTIFICATION

A. Provide engraved lamacoid nameplate for each transformer.

3.5 FIELD QUALITY CONTROL

A. Test Objectives: To ensure transformer is operational within industry and manufacturer's tolerances, is installed according to the contract documents, and is suitable for energizing.

B. Tests: Include the following minimum inspections and tests according to manufacturer's written instructions. Comply with IEEE C57.12.91 for test methods and data correction factors.

1. Inspect accessible components for cleanliness, mechanical and electrical integrity, and damage or deterioration. Verify that temporary shipping bracing has been removed. Include internal inspection through access panels and covers.

2. Inspect bolted electrical connections for tightness according to manufacturer's published torque values.

C. Test Failures: Compare test results with specified performance or manufacturer's data. Correct deficiencies identified by tests and retest. Verify that transformers meet specified requirements.

3.6 CLEANING
A. On completion of installation, inspect components. Remove paint splatters and other spots, dirt, and debris. Repair scratches and mars on finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

3.7 ADJUSTING

A. After installing and cleaning, touch up scratches and mars on finish to match original finish.

B. Adjust transformer taps to provide optimum voltage conditions at utilization equipment throughout normal operating cycle of facility. Record primary and secondary voltages and tap settings and submit to owner.

C. Adjust buck-boost transformer connections to provide optimum voltage conditions at utilization equipment throughout normal operating cycle of facility.

END OF SECTION 262200
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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.

B. Related sections:

1. Section 260526 - Grounding.

1.3 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

D. Maintenance Data: For panelboards and components, include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.
1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.

C. Comply with the NEC.

1.5 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Panelboards, Overcurrent Protective Devices and Accessories:
   c. Siemens
   d. Square D Co.; Schneider Electric Brands
   e. Or approved equal.

2.2 FABRICATION AND FEATURES

A. Enclosures: Flush or surface mounted cabinets (as indicated on drawings). Construct cabinets with code gauge galvanized steel. Provide minimum 20” wide cabinets and extra wiring space where incoming feed-through or parallel lines are shown. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Doors: Provide door-in-door construction, made of cold-rolled steel. Inner door shall provide access to breaker handles and outer door shall provide access to wiring space as well. Inner door shall be completely flush with no visible bolts, screw-heads or hinges and with flush catch and lock. Outer
door shall have concealed hinges, flush catch and lock to match inner door, located in line with inner
door catch. (Tee bar handles are not acceptable).

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard
door.

F. Bus: Hard-drawn copper, 98 percent conductivity. Attach circuit breakers to bus so that circuits 1,
3, and 5; 2, 4, and 6, or any three similarly numbered circuits form one three-phase, four-wire
circuit.

G. Main and Neutral Lugs: Compression or mechanical type suitable for use with conductor material.

H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors;
bonded to box.

I. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for
future installation of devices.

J. Isolated Equipment Ground Bus: Where indicated on drawings - Adequate for branch-circuit
equipment ground conductors; insulated from box.

K. Extra-Capacity Neutral Bus: Where indicated on drawings, neutral bus rated 200 percent of phase
bus and UL listed as suitable for nonlinear loads. Where indicated on plans, On 120/208Y Panels fed
by K factor Type Transformer.

L. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for
attachment to panelboard, wall, and ceiling or floor. Where indicated on plans.

M. Gutter Barrier: Arrange to isolate individual panel sections.

N. Feed-through Lugs: Compression or mechanical type suitable for use with conductor material.
Locate at opposite end of bus from incoming lugs or main device. For two-section panels.

O. Panels located adjacent to each other shall have identically sized enclosures and trims.

2.3 PANELBOARD SHORT-CIRCUIT RATING

A. UL label indicating series-connected rating with integral or remote upstream devices. Include size
and type of upstream device allowable, branch devices allowable, and UL series-connected short-
circuit rating. If not series rated: Fully rated to interrupt symmetrical short-circuit current available
at terminals or the rating indicated on the plans, whichever is higher.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices:
1. 120/208Y volt branch circuit panelboards: Quick-make, quick-break, molded case plug-in type designed for 120/208Y volt, three-phase, four-wire service with minimum 10,000 amperes rms short circuit rating.

2. 277/480Y volt branch circuit panelboards: Molded case bolt-on type designed for 277/480Y volt, three-phase, four-wire service with minimum 14,000 amperes rms short circuit rating.

3. Provide multi-pole units with common trip elements.

4. Breaker shall have center-tripped position in addition to the ON and OFF positions.

5. Provide lockouts for all circuits that should not be inadvertently tripped (as indicated on the drawings).

2.5 OVERCURRENT PROTECTIVE DEVICES

C. Feeder Circuit Breaker Assemblies 150 Amp and below:

1. Feeder Circuit breakers 150 Amp and below shall be thermal Magnetic Circuit breaker: Inverse time Current element for low level overloads, and instantaneous magnetic trip element for short circuits, unless otherwise indicated or required to meet Section 2.4 C above. Minimum features below:
   
   a. UL listed for 80 percent load application unless otherwise indicated on plans.
   b. Circuit Breaker shall allow the UL listed field installation internal accessories (Auxiliary Switch, Shunt Trip, Undervoltage release, Bell Alarm Switch) without removal of cover to install. Circuit Breaker shall include Accessories as indicated on plans.
   c. Circuit breaker handle accessories shall provide provisions for locking handle in the ‘ON’ or ‘OFF’ position

2. Where specifically indicated or required by NEC

   a. Adjustable [L] Long time time-delay and ampere setting with Long time pickup (ampere setting) determined by interchangeable rating plug.
   b. Adjustable [S] Short time-delay and pick-up.
   c. Adjustable [I] Instantaneous trip.
   d. Adjustable [G] Ground fault pick-up and delay where indicated or required be NEC.
   e. Where Indicated special zone control interlocking for main breaker and future main and tie breaker of double-ended substation switchboard
   f. Short circuit, overload and ground fault trip indicators.
   g. Trip device of circuit breakers shall be of same type for tripping coordination.

D. General Breaker Requirements:

1. Minimum interrupting capacity shall match the minimum required interrupt rating of the panel.

2. Standard frame sizes, trip ratings, and number of poles.

3. Lugs: Mechanical or compression style, suitable for number, size, trip ratings, and material of conductors.

4. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

5. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Clearances: Minimum code required clearances around panelboards must be maintained.

C. Mounting Heights: Top of trim 78 inches above finished floor, unless otherwise indicated.

D. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

E. Mounting Hardware: Provide all necessary blocking, channels and other hardware for securing panelboards to wall, column or other parts of building structure.

F. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

G. Install filler plates in unused spaces.

H. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components.

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws. Label shall include panel designation, voltage and phase in minimum ¼” high letters.

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.4 FIELD QUALITY CONTROL

A. After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit breaker trip ranges.
B. Adjust all operating mechanisms for free mechanical movement.

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 262416
SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes receptacles, switches, and finish plates.

1.3 DEFINITIONS
   A. GFCI: Ground-fault circuit interrupter.
   B. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS
   A. Submit shop drawings and product data.

1.5 COORDINATION
   A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers:
      1. Wiring Devices:
         a. Bryant; Hubbell, Inc.
         b. GÉ Company; GE Wiring Devices.
         c. Hubbell Wiring Device – Kellems
         d. Leviton Manufacturing Co., Inc.
         e. Pass & Seymour/Legrand; Wiring Devices Div.
         f. Cooper Wiring Devices
         g. Or approved equal.
2. Wiring Devices for Hazardous (Classified) Locations:
   b. Or approved equal.

3. Multi-outlet Assemblies:
   a. Wiremold.
   c. Or approved equal.

2.2 RECEPTACLES

A. General Requirements for All Devices:
   1. Each device shall have an amperage rating not less than that of the branch circuit feeding the
      branch circuit(s). Ivory color, UNO
   2. All devices shall be Commercial Specification Grade (Construction specification grade is
      prohibited), UNO.

B. Straight-Blade: All devices shall be Tamper Resistant unless noted otherwise.

C. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter.
   Provide one device for each location, daisy-chaining devices is not acceptable and each device shall
   operate independently of each other.

E. Multi-Outlet assemblies: Metal with Ivory color finish.

2.3 SWITCHES

A. Snap Switches: General-duty, quiet type, rated 20 amperes, 120/277 volts AC. Handle: Ivory plastic.
   Pilot light type (where indicated): lighted handle.

B. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and
   audible and electromagnetic noise filters.
   2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide;
      single pole with soft tap or other quiet switch; electromagnetic filter to eliminate noise, RF,
      and TV interference; and 5-inch wire connecting leads.
   3. Fluorescent Lamp Dimmers: Modular; compatible with dimmer ballasts; trim potentiometer
      to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming to a
      maximum of 1 percent of full brightness.

2.4 WALL PLATES

A. Single and combination types match corresponding wiring devices.
2. Cover plate for surface mounted devices: Galvanized steel.
3. Weatherproof cover plate: While in use, gasketed, cast metal, hinged device covers.
4. Plate-Securing Screws: Metal with head color to match plate finish.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Install devices and assemblies plumb and secure.
B. Install wall plates when painting is complete.
C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.
D. Do not share neutral conductor on load side of dimmers.
E. Arrangement of Devices: Unless otherwise indicated, mount flush, vertically, with height as indicated or six inches above counters.
F. Group adjacent switches under single, multigang wall plates.
G. Protect devices and assemblies during painting.
H. Install wall switches with off position down.
I. Install cover plates on switch, receptacle, and blank outlets.

3.2 IDENTIFICATION
A. Switches and receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on the outside of the face plate for receptacles and on the inside of the face plate for switches; utilize durable wire markers or tags within all outlet boxes. Labels shall be Brother ½” TZ tape, black ink on clear, extra-strength adhesive tape, with size 18 text or engineer approved equal. Use matching label printer.

3.2 CONNECTIONS
A. Connect wiring device grounding terminal to outlet box with bonding jumper.
B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
C. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.
D. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values.
3.4 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Check each device to verify operation.

B. Test GFCI operation according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.5 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 262726
SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces and recessed in canopies, emergency lighting units, and accessories.
   B. Related Sections include the following:
      1. Section 260923 Lighting Control Devices.

1.3 SUBMITTALS
   A. Product Data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features and accessories.
   B. Maintenance data for lighting fixtures.
   C. Emergency lighting units including battery and charger.

1.4 QUALITY ASSURANCE
   A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in the NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction.
   B. Comply with the NEC.
   C. FM Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM.
   D. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.5 COORDINATION
   A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, partition assemblies, and other construction.
1.6 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining four years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: As indicated on the drawings.

2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs, sharp corners, and edges.

B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.

2. Lens Thickness: 0.125 inch minimum, unless greater thickness is indicated.

2.5 EXIT SIGNS

A. General Requirements: Comply with UL 924 and the following:

1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.

B. Internally Lighted Signs: As follows:

1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.

C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
1. Battery: Sealed, maintenance-free, nickel-cadmium type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Remote Test – Where indicated on the drawings: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
7. Integral Self-Test – Where indicated on the drawings: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.6 EMERGENCY LIGHTING UNITS

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate LED fixture continuously at an output of 1100 lumens for 90 minutes. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space. Provide integral to fixture or mounted adjacent to fixture.
   a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
   b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
5. Battery: Sealed, maintenance-free, nickel-cadmium type.
6. Charger: Fully automatic, solid-state type with sealed transfer relay.
7. Night-Light Connection: Where night-light option is called out in the drawings, operate one fluorescent lamp continuously.

B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering LED fixture, remote mounted from lighting fixture. Comply with UL 924.

1. Emergency Connection: Operate 1 or 2 fluorescent lamps continuously at an output of 1100 lumens for 90 minutes. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Housing: NEMA 250, Type 1 enclosure.
5. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
6. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.7 FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.

B. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

C. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm)

2.9 FINISHES

A. Fixtures: Manufacturer's standard, unless otherwise indicated.

1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.

B. Furnish and install a protective barrier around fixtures that are not insulation-contact-rated (non-IC-rated) in locations where insulation is installed. The protective barrier shall be installed to yield a 4” air-gap from the fixture on all sides and top.

C. Support for Fixtures in or on Grid-Type Suspended Ceilings: Attach supports to building structure.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.

D. Suspended Fixture Support: As follows:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
3. Continuous Rows: Suspend from cable installed according to fixture manufacturer's written instructions and details on Drawings.
3.2 CONNECTIONS

A. Ground equipment.
   1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Tests: As follows:
   1. Verify normal operation of each fixture after installation.
   2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.

C. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

3.4 CLEANING AND ADJUSTING

A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.

B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION 265100
SECTION 266000 – ELECTRICAL DEMOLITION AND REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes electrical demolition and repair. Work includes removal of obsolete wiring and electrical apparatus; relocation, reconnection or replacement of existing wiring affected by demolition or new construction; capping off concealed wiring abandoned due to demolition or new construction.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Conductors and Cables: Refer to Section 260519 – Conductors and Cables.

B. Raceways and Boxes: Refer to Section 260533 – Raceways and Boxes.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety. Completely remove all exposed traces, hardware, wiring and conduit systems to the source. All knockouts and holes shall be patched or plugged.

C. Contractor shall re-use existing straight conduit runs and factory bends for conduits 2” and larger, provided that they are not damaged in any way and are installed in accordance with Section 260533.

D. Re-use of all other electrical apparatus and material is subject to approval by owner.

E. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
F. Remove demolished material for recycling as directed by owner.

G. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

H. Power outages shall be held to a minimum and coordinated with the owner. Contractor shall schedule outages during off-hours.

END OF SECTION 266000
SECTION 271300 - COMMUNICATIONS CABLING

PART 1 - GENERAL

1.1  RELATED DOCUMENTS

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

1.2  SCOPE OF WORK

A. The Contractor shall furnish and install all materials for a complete, functional data and voice communications system in accordance with this specification and the contract drawing. Contractor shall be responsible for providing a complete, functional system including all necessary components, whether included in this specification or not.

B. The installation shall include all cable and raceway (twisted-pair copper, fiber optical cabling, and coax cabling), conduit raceway, innerduct, interconnect-patching equipment, connectors, and jumpers, wiring blocks and telecommunications outlets. There will be two types of installation – 1) UTP installed in surface mount raceway (approved only in unfinished areas), and 2) UTP installed in conduit and boxes within walls or above ceilings. Multiple drops in a single box within wall will be fed by one vertical raceway with raceway sized to accommodate the required cabling – see building drawings for additional information.

C. In addition to material and equipment, Contractor shall provide labor and any incidental material required for installation. All copper station cables shall be terminated on patch panels at distribution frames and on data communication outlets at the workstation end, all fiber optical cables shall be terminated on rack mounted light interface units (LIU), all coax cables to be terminated on amplifiers in rack and on f connectors at the outlet end.

D. The owner and user, upon completion of the project, shall furnish all active equipment unless specifically noted on drawings and within specifications.

E. Upon completion of installation, Contractor shall test all copper, fiber optical, and coax cabling and record the test results in a test results binder and deliver to owner.

F. The work performed under this specification shall be of good quality and performed in a workmanlike manner. In this context “good quality” means the work shall meet industry technical standards and quality of appearance. The owner reserves the right to reject all or a portion of the work performed, either on technical or aesthetic grounds.

G. Voice and data cabling and outlets for pay phones, fax machines, modems, wall telephones, and fire alarm communicators, including Fire Alarm Communicator testing, shall be provided by Contractor.

H. All cable trays, wiring and server racks, etc., shall be furnished and installed by the contractor when indicated on the drawings and/or in this specification.
I. Cable shall be routed as close as possible to the ceiling, floor, or corners to insure that adequate backboard space is available for current and future equipment and for cable terminations. Cables shall not be tie-wrapped to electrical conduit, ceiling grid wire or other equipment. Minimum bend radius shall be observed. Cable transitions between plenum and non-plenum spaces, through drop ceilings (between horizontal and vertical risers), and through walls shall be routed through appropriate sized cable sleeves.

1.3 SUMMARY

A. Section Includes:

1. Pathways.
2. UTP cable.
3. 9/125-micrometer, optical fiber cabling.
5. Cable connecting hardware, patch panels, and cross-connects.

B. Related Sections:

1. Drawing and General Provisions of the Contract, apply to work specified in this Section.
2. Applicable Standards: All work shall be performed in accordance with the latest revisions of the following standards.
   - ANSI/TIA/EIA-568-C.1 and addenda
     "Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements"
   - ANSI/TIA/EIA-568-C.2 and addenda
     "Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling Components"
   - ANSI/TIA/EIA-568-C.3 and addenda
     "Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling Components Standard"
   - ANSI/TIA/EIA-569-A and addenda
     "Commercial Building Standard for Telecommunications Pathways and Spaces"
   - ANSI/TIA/EIA-606-A and addenda
     "Administration Standard for the Telecommunications Infrastructure of Commercial Buildings"
   - ANSI/TIA/EIA-607 and addenda
     "Commercial Building Grounding and Bonding Requirements for Telecommunications"
   - ANSI/TIA/EIA-526-7
     "Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant"
   - ANSI/TIA/EIA-526-14-A
   - International Fire Code 2003 Edition
The most recent versions of all documents apply to this project.

B. Quality Assurance

1. Contractor Qualifications: Work in this section shall be performed by a licensed and bonded low voltage contractor, which has been in business for a minimum of five years in the maintenance and installation of high-speed data and voice networks. Only Contractors whose primary business in that of installing, maintaining, troubleshooting and testing computer and communication network systems shall perform this work.

2. The Contractor shall have installed cable plant in at least three buildings similar in size and scope to the project building and shall furnish references to the Owner and/or Engineer upon request.

3. The Contractor shall be completely familiar with the TIA/EIA standards for telecommunications raceway / pathway infrastructure systems and with the telecommunications design practices as defined in the BICSI Telecommunications Distribution Methods Manual.

4. Contractor must be a trained and certified for the communications cable and hardware, which it installs, and must furnish proof of certification.

5. Contractor should have a BICSI registered RCDD on staff.

6. A Systimax Solutions System Warranty shall provide a complete system warranty to guarantee end-to-end high performance cabling systems that meet application requirements. The guarantee shall include cable and connectivity components and have one point of contact for all cabling system issues. The system shall be warranted for a period of 25 years. The manufacturer of the telecommunications equipment, devices and cable shall warranty the entire telecommunications structured cable system to be in compliance with applicable codes and standards, and to be free from defects in materials and workmanship. The warranty shall apply to all passive structured cabling system components, and shall cover failure of the system to support applications in accordance with the performance levels stipulated in the referenced TIA/EIA standards. This warranty shall extend for a period of at least (25) years from the date of final field-testing and acceptance of the system, and shall cover the full cost of all repairs and all replacement for the entire system.

7. Upon successful completion of the installation and subsequent inspection by the manufacturer’s project manager, the certified SYSTIMAX contractor of the telecommunications equipment, devices and cable shall register the telecommunications structured cable system installation, and shall furnish a numbered registration certificate to the owner immediately upon completion. Both copper and fiber test results should be submitted in the test manufacturers native format to CommScope for review with the submitted Warranty Application. A soft copy of the test results will also be sent to West Ada School District for their record.

8. A factory registered Systimax Solutions System contractor shall be on the construction site at all times while work is being performed; no subcontracting shall be allowed. All products specified herein shall be installed by the contractor represented in the proposal. The
contractor shall have completed standards based product and installation training. A copy of
the Systimax Solutions System Contractor Registration shall be submitted in the proposal.

a. All Systimax Solutions System non-consumable products have a 25-year guarantee.
When installed per TIA or ISO/IEC standards, the Systimax Solutions System
Network Cabling System will operate the application(s) for which the system was
designed to support. Applications may include, but are not limited to:

10/100/1000/10000 Mbps Ethernet (IEEE 802.3)
4/16 Mbps Token Ring (IEEE 802.5) 155, 622,
1.25 Gbps ATM
SONET
FDDI/CDDI
IBM System 3x-AS/400
Appletalk
ISDN

In order to qualify for the guarantee, the structured cabling system must be installed per
the following:

1. Meet all TIA/EIA commercial building wiring standards.
2. Systimax Solutions System categorized product must be used in conjunction with
an equivalent or higher Category UL or ETL verified cable.
3. Systimax Solutions System must be installed per Systimax Solutions System
instruction sheets.

Note: All Networks shall be installed per applicable standards and manufacturer's
guidelines.

If any Systimax Solutions System product fails to perform as stated above, Systimax
Solutions System will provide new components at no charge.

9. LICENSE CLASSIFICATION: Contractor must possess a valid Idaho State Contractor’s License.

1.4 DEFINITIONS


B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection
or cross-connection.

C. EMI: Electromagnetic interference.

D. IDC: Insulation displacement connector.

E. LAN: Local area network.
1.5 BACKBONE CABLING DESCRIPTION

A. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.6 PERFORMANCE REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

B. Governing Codes and Conflicts

1. If the requirements of this section or the Project Drawings exceed those of the governing codes and regulations, then the requirements of this section and the Drawing shall govern. However, nothing in this section or the Drawings shall be construed to permit work not conforming to all governing codes and regulations.

1.7 SUBMITTALS

A. Prior to installation of any equipment, the Contractor shall provide the Engineer and/or the Owner with six (6) copies of submittals and drawings for approval. Submittals shall include a list of equipment with model numbers and quantities, catalog cuts, equipment specification sheets and installation instructions. Drawings shall include floor plans with equipment and wire locations, room numbers, one-line risers, and the jack numbering system proposed for the project. No equipment shall be purchased for the project until shop drawings have been reviewed and approved by the engineer and/or the owner.

B. Product Data: For each type of product indicated.

1. For UTP (Copper) cable, include the following installation data for each type used:
   a. Nominal OD.
   b. Minimum bending radius.
   c. Maximum pulling tension.

2. For Fiber Optical cable, include the following installation data for each type used:
   a. Nominal OD.
   b. Minimum bending radius.
   c. Maximum pulling tension.
3. For coaxial cable, include the following installation data for each type used:
   a. Nominal OD.
   b. Minimum bending radius.
   c. Maximum pulling tension.

4. For all components of the system.

C. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration drawings and printouts.
4. Wiring diagrams to show typical wiring schematics including the following:
   b. Patch panels.
   c. Patch cords.
5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
   a. Vertical and horizontal offsets and transitions.
   b. Clearances for access above and to side of cable trays.
   c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
   d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

D. Substitution Requests

1. Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Use CSI Form 13.1A or contractor/vendor form, which is substantially similar to the CSI form.

2. Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as
performance, weight, size, durability, visual effect, and specific features and requirements indicated.

d. Product Data, including drawings and descriptions of products and fabrications and installation procedures. Provide all available engineering documents, instructions, drawings and third party test reports.

e. Samples of each of the products being offered for substitution.

f. List of similar installations for completed projects with project names and addresses and address of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

i. Detailed comparison of Contractor’s Construction Schedule using proposed substitution with products specified in the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer’s letterhead, stating lack of availability or delays in delivery.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. Contractor’s certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

l. Contractor’s waiver of rights to additional payment or time that may subsequently become necessary because of failure or proposed substitution to product indicated results.

m. Acceptance of substitution must be received from the Owner in writing.

E. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

F. Source quality-control reports.

G. Field quality-control reports.

H. Maintenance Data: For splices and connectors to include in maintenance manuals.

I. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.

2. Program Software Backup: On magnetic media or compact disk, complete with data files.

3. Device address list.

4. Printout of software application and graphic screens.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Installation Supervision: Installation shall be under the direct supervision of Registered Systimax Solutions System Technician, who shall be present at all times when Work of this Section is performed at Project site.

2. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.


1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Patch-Panel Units: One of each type.
2. Connecting Blocks: One of each type.
3. Device Plates: One of total of each type.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

1.11 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.12 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All products shall be new, and brought to the job site in original manufacturer’s packaging.
   1. Electrical components shall bear the Underwriter’s Laboratories label.
   2. Comply with TIA/EIA-569-A.

B. Telecommunications System Description
   1. Provide the indicated number of Category 6A cables to each outlet. All horizontal cables are terminated on Category 6A UTP jacks installed in rack-mounted modular patch panels. Horizontal data circuits are connected to LAN electronics within each data rack location.

C. Cable Support: NRTL labeled for support of Category 6A cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
   1. Support brackets with cable tie slots for fastening cable ties to brackets.
   2. Lacing bars, spools and J-hooks.
   3. Straps and other devices. D. Cable Trays:

   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. WBT
      b. Cooper B Line

   2. See specification section 260536 CABLE TRAYS FOR ELECTRICAL SYSTEMS for further information.

E. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
   1. Outlet boxes shall be no smaller than 4 inches wide, 4 inches high, and 3 inches deep.
   2. Conduit shall be no smaller than 1”.

2.2 HORIZONTAL DISTRIBUTION SUB-SYSTEM

A. Work Area Faceplate
   1. Number of jacks per outlet location is as shown on plans. Use single-gang, flush mounted faceplates. Faceplates, single and double gang boxes shall match receptacle and switch cover plates per spec section 26 “wiring devices”. Provide blank faceplate inserts at any unfilled parts at the faceplates.

   Approved Manufacturer:
   CommScope: M12L-262 (MID: 108168469) 2 PORT WHITE
B. 4pr UTP Cabling

1. Horizontal station cable shall be Category 6A, 23 AWG UTP, UL/NEC CMR or CMP, non-plenum or plenum rated with a PVC jacket as required for the application. Any Horizontal Cabling being installed above drop ceiling shall be Plenum rated unless written permission by West Ada School District to install non-Plenum. In order to run non Plenum cable the vendor must provide verification that the area being run is non Plenum rated and get written permission from the director of I.T and head of facilities.

2. Cable color designation should use to identify the systems application. The following colors will be used:
   - Blue = Data Network
   - Green = WAP
   - Orange = Security Camera and Locks
   - Yellow = Speakers and Clocks
   Approved manufacturer:
   - SYSTIMAX: PVC 1091B
   - SYSTIMAX: Plenum 2091B

C. Modular Jacks

1. All modular jacks shall be wired to the T568B wiring pattern. Modular jacks shall be of Snap into type. Modular jacks shall be UL Listed.

2. Category 6A modular jack devices, 8-position, 8-conductor modular jacks shall terminate unshielded twisted four pair, 22-26AWG, 100 Ohm cable and shall require the use of a punch down tool. Jack module shall use forward motion termination to optimize performance by maintaining cable pair geometry and eliminating conductor untwist.

3. Information Outlet color designation should use to identify outlet application. The following colors will be used:
   - White = Data Network
   - Green = WAP
   - Orange = Security Camera and Locks
   - Yellow = Speakers and Clocks

4. Refer to drawings and electrical legend for symbol type and/or notes, which dictates the number of jacks and cable drops required.

Approved manufacturer:
- SYSTIMAX: MGS600–262 (MID: 760092452) CAT6A WHITE
- MGS600-226 (MID: 760092403) CAT6A GREEN
- MGS600-112 (MID: 760092379) CAT6A ORANGE
- MGS600-123 (MID: 760092387) CAT6A YELLOW
D. Raceway

1. Work shall include furnishing all raceway and appropriate fittings and device plates to install a nonmetallic surface raceway system as indicated in the project drawings. Installer shall comply with detailed manufacturer’s instruction sheets which accompany system components.

2. All surface mounted raceways will be affixed to walls with the appropriate screws via pre-punched mounting holes. No adhesive tape shall be used to secure the raceway.

3. Multiple drops on a single wall will be fed by one vertical raceway.

4. All raceway will be plum and level.

5. Refer to drawing for locations and mounting heights and arrangement.
   
   Approved manufacturer: Panduit or Wiremold

2.3 HORIZONTAL CROSS-CONNECT TERMINATION HARDWARE

A. Horizontal Data Cross-Connect

1. Copper Patch Panels will be mounted in rack in specific order based on systems application. From Top Down the Panel will be WAP, Informacast & Security, Data Network. See drawings below. Patch Panels will be dedicated for their application. No more than 384 cables per rack. See appendix A.

2. Single rack configurations: from top down the panel will be WAP, Informacast & Security, Data Network

3. Two rack configurations:
   
   a. Rack 1: All panels will be Data Network
   b. Rack 2: From top down the panels will be WAP, Informacast & Security

4. Patch panels shall be SYSTIMAX 360 1100 series Evolve 24 port, imVision Enabled, flat inforpanel.

   Approved Manufacturer:
   SYSTIMAX: 360-iP-1100-E-GS6-1U-24 (MID: 760201145)
   SYSTIMAX: 360-imV-CNTRLR (MID: 760161380)
   SYSTIMAX: 360-imV-JMPR-CNTRL-10 (MID: 760164822)

3. Horizontal data cross-connect patch cords shall be provided for 100% of the patch panel terminations and be of adequate length to ensure proper cable bending radius. Provide patch cords for all devices listed below.

   Approved manufacturer:
   SYSTIMAX:
A. Provide 1-foot Black patch cord for all Data Network.
   Part #: CPCSSX2-01F001
B. Provide 10-foot LT Blue patch cord for 50% of all Data Network cables.
   Part# CPCSSX2-02F010
C. Provide 4-foot LT Blue patch cord for 50% of all Data Network cables.
   Part# CPCSSX2-02F004
D. Provide 1-foot green patch cord for all WAP terminations
   Part #: CPCSSX2-04F001
E. Provide 3-foot green patch cord for all WAP.
   Part #: CPCSSX2-04F003
F. Provide 1-foot orange patch cord for all camera and keypad terminations.
   Part #: CPCSSX2-06F001
G. Provide 3-foot orange patch cord for all cameras.
   Part #: CPCSSX2-06F003
H. Provide 1-foot yellow patch cord for all Informacast speakers.
   Part #: CPCSSX2-09F001
I. Provide 3-foot yellow patch cord for all Informacast speakers.
   Part #: CPCSSX2-09F003
E. Provide 1-foot red patch cord for all management devices such as climate control.
   Part# CPCSSX2-07F001
F. Provide 1-foot white patch cord for analog devices such as fax machines.
   Part# CPCSSX2-08F001

2.4 CABLE MANAGEMENT TIES

A. Bundle all communications cables together with Velcro only. Cables of similar type should be bundled together. ie; Cat6 in a bundle, Cat5e in a separate bundle & Coax in a separate bundle.

   Approved Manufacturer: Panduit or similar.

2.5 COMMUNICATIONS BACKBOARD

A. Data/Voice terminal backboards shall be ¾” thick plywood painted with two (2) coats of White, fire retardant paint, APA exterior grade Douglas Fir A-C, and fire retardant with flame spread rating not more than 25 when tested according to ASTM E-84. Refer to drawing for locations, quantities and mounting arrangement.

2.6 EQUIPMENT MOUNTING RACKS

A. Equipment Rack(s): Contractor will use owners existing enclosed and open racks when possible. Provide 19” wide with number of vertical rack sections as required to allow space for termination of all Category 6 cabling plus mounting space for multi-port switches required to cross-connect all data jacks. See Drawings for details. Rack location to be determined by owner. Owner
desires a 4 post rack in each data closet with a minimum of a 4 post in the MDF. If 4 post racks
don’t fit in the IDF then a 2 post rack should be installed. If a 2 post rack will not fit, then please
contact WestAda School District prior to moving to wall mounted racks. All racks are to be
securely mounted to the floor. Note (3-foot area in front and behind the rack should be left open
for accessibility). Where possible all power requirements should be put on the rack to prevent
tripping hazards behind or in front of the rack.

1. Approved Manufacturer for Enclosed Wall Mount Cabinet: Chatsworth Part#: 11840-736
2. Fan Kit for Wall Mount Cabinet: Chatsworth Part#
3. Filter Kit for Wall Mount Cabinet: Chatsworth Part#
5. CommScope Two Post Rack: MID: 760082479

B. Distribution Rack Grounding: furnish ground terminal strip for each rack section installed. Rack
shall be grounded using stranded, #6 AWG Green insulated copper conductor. Furnish all
required bonding material and hardware, and bond to building grounding electrode subsystem

1. Approved Manufacturer: Chatsworth

C. Cable Runway: Cable trays shall be installed in hallway above the suspended ceilings supported
at a maximum of four-foot intervals. Cable tray path will be determined by owner and contractor
and tray size determined by number of cables.

1. Approved Manufacturer: WBT P/N WBTS4X18

Equip each floor rack with ladder style cable runway installed between the backboard and the
equipment rack. Securely attach to backboard and rack in accordance with manufacturers written
instructions. See Drawings for details.

1. Approved Manufacturer: Commscope P/N: 760085647

D. Vertical Wire Management: The Cable Management System shall be used to provide a neat and
efficient means for routing and protecting fiber and copper cables and patch cords on
telecommunication racks and enclosures. The system shall protect network investment by
maintaining system performance, controlling cable bend radius and providing cable strain relief.

The Vertical Wire Management used at West Ada School District projects shall be either Single
Sided or Double Sided per the project design. Each floor mounted rack shall have a Vertical
Wire Manager on each side of rack for routing of cable on the back side and patch cords on the
front side. If two racks are side by side, then only one Vertical Wire Manager is needed in-
between with another Vertical Wire Manager on each end of row.

No Vertical Wire Manager is required for Wall Mounted racks/cabinets.

Approved Manufacturer
1. Single sided: CommScope VCM-SS-84-6 (MID: 760072868)
2. Double Sided: CommScope VCM-DS-84-6 (MID: 760072785)
2.7 OPTICAL FIBER

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. SYSTIMAX Solutions; TeraSPEED

B. Interior Optical Fiber Description: Singlemode, OS2, 12-fiber, distribution Plenum, Armored, gel-free optical fiber cable. CommScope number P-012-DZ-8W-FSUYL
   1. Comply with ICEA S-83-596 for mechanical properties.
   2. Comply with TIA/EIA-568-B.3 for performance specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
      1. General Purpose, Nonconductive: Type OFN or OFNG.
      2. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
      3. Plenum Rated, Conductive: Type OFCP, complying with NFPA 262.
   5. Conductive cable shall be aluminum armored type.
   7. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

C. Singlemode fiber optic Premises Cable – Zero Water Peak – Riser and Plenum
   1. The cable shall be available in riser and plenum types with a Yellow sheath.
   2. The premises cable shall use a standard colored tight buffered construction.
   3. The higher fiber count cables shall utilize a sub-unitized design with color-coded sub units for easy identification.
   4. The cable shall deliver a cost-effective upgrade path by expanding the available wavelengths by 50% and allowing up to 18 channels of CWDM (Coarse Wave Division Multiplexing) on a single fiber and up to 400 channels of DWDM (Dense Wave Division Multiplexing) on a single cable.
   5. The cable shall operate over the entire wavelength range from 1260 nm to 1625 nm, removing the water peak (high attenuation) in the E-band, adding more than 50% in operational wavelength range over conventional singlemode fiber.

<table>
<thead>
<tr>
<th>Physical Specifications:</th>
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<tbody>
<tr>
<td>Core Diameter:</td>
</tr>
<tr>
<td>Cladding Diameter:</td>
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<tr>
<td>Core/Clad Offset:</td>
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<tr>
<td>Cladding Non-Circularity:</td>
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<tr>
<td>Coated Fiber Diameter:</td>
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<tr>
<td>Cladding/Coating Offset:</td>
</tr>
<tr>
<td>Colored Fiber Diameter:</td>
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</tbody>
</table>
Proof Test: 0.7 GPa
Fiber Curl: > 4 m
Dynamic Fatigue Parameter: 18
Macrobend (100 turns, 50 mm mandrel): 0.10 dB @ 1310 nm and 1550 nm
Macrobend (1 turn on a 32 mm mandrel: 0.50 dB @ 1310 nm and @ 1550 nm

Optical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode Field Diameter:</td>
<td>9.2 (± 0.3) µm @ 1310 nm 10.4 (nominal) @ 1550 nm</td>
</tr>
<tr>
<td>Group Index of Refraction:</td>
<td>1.466 @ 1310 nm and 1383 (± 3) nm, 1.467 @ 1550 nm</td>
</tr>
<tr>
<td>Attenuation of Tight Buffered Fibers:</td>
<td>0.7 dB/km @ 1310 nm</td>
</tr>
<tr>
<td>Maximum Dispersion:</td>
<td>3.5 ps/nm-km @ 1285 to 1330 nm, 18 ps/nm-km @ 1550 nm</td>
</tr>
<tr>
<td>Zero-Dispersion Wavelength:</td>
<td>1300 - 1322 nm</td>
</tr>
<tr>
<td>Zero-Dispersion Slope:</td>
<td>0.092 ps/(nm)(km)</td>
</tr>
<tr>
<td>Polarization Mode Dispersion LDV:</td>
<td>0.08 ps/(km)²</td>
</tr>
</tbody>
</table>

D. Exterior Optical Fiber Description: Single mode, 9/125 micrometer, 12 -fiber, Indoor/Outdoor, distribution Plenum, non-armored, gel-free optical fiber cable. CommScope number P-012-LN-8W-F12BK/25D. If fiber is installed in conduit and/or less than 50ft into the building, then Riser rated is acceptable. CommScope number R-012-LN-8W-F12BK/25D.

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA/EIA-568-B.3 for performance specifications.
4. Maximum Attenuation: 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
5. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

E. Jacket:

2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.8 OPTICAL FIBER CABLE HARDWARE

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

1. Systimax SCS.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
1. Number of Connectors per Field: 12 for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

C. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

Approved Manufacturer for 9/125 SM
1. CommScope: 1 Meter Duplex LC Yellow; Part #: FEWLCLC42-JXM001
2. CommScope: 2 Meter Duplex LC Yellow; Part #: FEWLCLC42-JXM002
3. CommScope: 3 Meter Duplex LC Yellow; Part #: FEWLCLC42-JXM003

D. Fiber Optic Connectors: SYSTIMAX QWIK II Fiber Optic Connectors shall be pre-polished, cam termination, simplex fiber optic connectors for singlemode glass fiber that fully complies with both the fiber optic connector performance requirements specified in TIA/EIA-568-B.3 and the intermatability requirements specified by the TIA-604 FOCIS-3 standard.

Approved Manufacturer
1. 9/125 SM: SYSTIMAX SFC-LCF-09-8X (MID: 760117895)

E. Rack Mounted Fiber Optic Patch Panels: Provide rack mounted modular enclosure units complete with connector couplings mounted in LC connector panels for interconnection of backbone optical fiber cables as specified herein. Units shall be sized to terminate all fibers indicated on the Drawings using mechanical or fusion splices.

Approved Manufacturer
1. SYSTIMAX 360G2-1U-MOD-SD (MID: 760193771)
2. 9/125 SM: 360G2-Cartridge-12-LC-SM-BL (MID: 760109272)

2.9 COAXIAL CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
1. CommScope Coax Solutions

B. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz. C. RG6/U: NFPA 70, Type CATVR.

1. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
4. Color-coded PVC jacket.

C. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:

1. CATV Cable: Type CATV.
2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
3. CATV Riser Rated: Type CATVR, complying with UL 1666.
4. CATV Limited Rating: Type CATVX.

2.10 COAXIAL CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Leviton Voice & Data Division.
   2. Siemon Co. (The).

B. Coaxial-Cable Connectors: Type F Connector

C. Coax amplifiers mounted in each rack: Blonder tongue model HAD-16-860-16
   1. Each IDF room to have Coax cable amplifier with radial feeds to each classroom TV and incoming feed from MDF.

2.11 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. CommScope, Inc.

B. Description: 100-ohm, four-pair UTP, binder groups covered with a blue thermoplastic jacket.
   1. Comply with ICEA S-90-661 for mechanical properties.
   2. Comply with TIA/EIA-568-B.1 for performance specifications.
   3. Comply with TIA/EIA-568-B.2, Category 6A.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
      a. Communications, General Purpose: Type CM or CMG.
      b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
      c. Communications, Riser Rated: Type CMR; complying with UL 1666.
      d. Communications, Limited Purpose: Type CMX
      e. Multipurpose: Type MP or MPG
      f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
      g. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

2.12 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. CommScope, Inc.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
C. Connecting Blocks: 110-style IDC for Category 6A. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
   1. Number of Terminals per Field: One for each conductor in assigned cables.

E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
   1. Number of Jacks per Field: One for each four-pair UTP cable indicated plus spares and blank positions adequate to suit specified expansion criteria.

F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

G. Patch Cords: Factory-made, four-pair cables in 1 Foot length for patch panel end and 10 Foot for outlet end lengths; terminated with eight-position modular plug at each end.
   1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6A performance. Patch cords shall have latch guards to protect against snagging.
   2. Patch cords shall have color-coded boots for circuit identification.
   3. Provide an additional 25% more than the total terminations at patch panels.

2.13 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
   1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
   2. PVC insulation.
   3. Unshielded.
   4. PVC jacket.
   5. Flame Resistance: Comply with NFPA 262.

2.14 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

2.15 GROUNDING
A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors. B. Comply with ANSI-J-STD-607-A.

2.16 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.17 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test cables on reels according to TIA/EIA-568-C.3.

C. Factory test singlemode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-C.3.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 PRODUCTION INSPECTIONS

A. The Contractor shall inspect all cable prior to installation to verify that it is identified properly on the reel identification label, that it is of proper gauge, containing correct number of pairs, and is the material ordered. Any physical damage to the cable and wire must be noted: nonuniform jacket thickness and jacket tightness should also be identified. Note any buckling of the jacket, which would indicate possible problems.

B. Installation approval by owner is required at each phase of construction as noted below. Proceeding without owner approval may result in rejection of work and/or installation and result in the contractor removing newly installed raceway, boxes, cables, racks, and etc (all system components).

1. Submittal documents (shop drawings).
2. Substitution requests.
3. Raceway Rough-in.
4. Rack location and installation.
5. Grounding.
6. Patch panel installation.
7. Contractor furnished electronics equipment.
8. Cable installation.
9. Cable terminations at Rack and faceplate.
10. Installation of faceplates.
3.2 INSTALLATION OF CABLES

A. Comply with NECA

B. General Requirements for Cabling:

2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices." Install 110-style IDC termination hardware unless otherwise indicated.
3. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
   a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
   b. Locate consolidation points for UTP at least 49 feet (15 m) from communications equipment room.
4. Install 110-style IDC termination hardware unless otherwise indicated.
5. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
13. Cable shall not be draped on, tied or otherwise secured to electrical conduit, plumbing, ventilation ductwork or any other equipment. Cable shall be secured to building supports or hangers or to additional blocks or anchors specifically installed for this purpose.
14. Conduit and Raceway Usage: All communications cable shall be installed in grounded metal Conduit or raceway dedicated for communications purposes, when called for on the Project Drawings, and not to be shared with electrical wiring. Cable trays shall be installed in hallway above the suspended ceilings supported at a maximum of four-foot intervals. Cable tray path will be determined by owner and contractor and tray size as noted in specifications and on drawings.
15. Cable Lubricants: Lubrications may not be used at any time for installation of inside plant cable.
16. Conduit and Raceway Fill: In general, communication raceway shall not be filled beyond 40% capacity.
17. Backboard and Rack Cable Supports: Clamps, “D-Rings” and Velcro tie-wraps are all Acceptable ways to support cable. However, installation of these supports must be done
with care so as not to cause crushing or distortion of the cable, nor cause tighter bends than the minimum radius permitted for each type cable. Refer to “Part 2-Products” of this specification section for specified supports and tie-wraps. C. UTP Cable Installation:

2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

C. Optical Fiber Cable Installation:

   Cable may be terminated on connecting hardware that is rack or cabinet mounted.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

G. Group connecting hardware for cables into separate logical fields.

H. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).

c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).

6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 DATA/TELEPHONE STATION CABBING

A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. No more than 12” of slack shall be stored in an in-wall box. Excess slack may be neatly coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable. Each cable shall be labeled with a numbering scheme approved by the Owner, at each end of the cable.

B. In addition, each cable type shall be terminated as indicated below:

   1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-A document, manufacturer’s recommendations and/or best industry practices.

   2. Pair untwist at the termination shall not exceed one-half an inch for Category 6A connecting hardware.

   3. Bend radius of the cable in the termination area shall not be less than 10 times the outside diameter of the cable.

   4. The cable jacket shall be maintained as close as possible to the termination point.

   5. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s). Modem jacks shall be considered the last voice jack in the sequence.

C. Station drop cable terminations shall be made at the data port at the patch panel and the same data outlet at the data/telephone station location. Label patch panel port and station outlet the same.
At each outlet box, a sufficient length of spare cable will be provided for terminating outlet devices such that the outlet can be easily removed and inspected.

D. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

E. Horizontal distribution cables shall be bundled in groups of not greater than 40 cables. Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle.

F. Cables shall not be attached to ceiling grid or lighting support wires. Where light support for drop cable legs is required, the contractor shall install clips to support the cabling.

G. The installation of cables around movable devices, instruments, sub panels, etc., shall be provided with adequate support, length, protection, and flexibility so that the cable is not damaged in the event the equipment is moved.

H. Data cable may be run perpendicular, parallel or at 45 degrees to building grid lines (excluding radial and circulate grid lines). Cable in ceilings and below raised floor areas shall be grouped and wrapped in Velcro bundles of two or more cables as appropriate. Every attempt shall be made to avoid running telecommunications close to (less than 24”) and parallel to power raceway and wiring, or close to light fixtures.

3.4 MDF/IDF BACKBOARD CABLELING

A. Cable installation must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance purposes such as access boxes, ventilation mixing boxes, access hatches to air filters, switch or electrical outlets, electrical panels, fire alarm equipment, clock systems, and lighting fixtures. Avoid crossing areas horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining maximum distance from these openings.

B. Cable shall be routed as close as possible to the ceiling, floor, or corners to insure that adequate backboard space is available for current and future equipment and for cable terminations. Cables shall not be tie-wrapped to existing electrical conduit or other equipment. Minimum bend radius shall be observed.

C. Lay cables via the shortest route directly to the nearest edge of the backboard from the mounted equipment or block. Lace or tie-clamp all similarly routed cables together, and attached by means of clamps screwed to the outside edge(s) of the backboard vertically and/or horizontally, then route via “square” corners over a path that will offer minimum obstruction to future installations of equipment, backboards, or other cables.
3.5 BACKBONE CABLE

A. Backbone cables shall be installed separately from horizontal distribution cables.

B. Where backbone cables and distribution cables are installed in a cable tray, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

3.6 CABLE LABELING

A. All cables shall be labeled at each end with the same numbering scheme as approved by West Ada School District.

B. The Contractor shall follow the West Ada School District approved labeling scheme for both faceplate and patch panel location (shown below). All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Patch Panels shall be labeled A, B, C…. Z continuous without skipping letters for each rack. The Panels shall be labeled on both front and back of Panel. See Labeling example below.

C. All label printing will be machine generated label using black on clear adhesive Mylar tape. Self-laminating labels will be used on cable jackets, appropriately sized to the outside diameter of the cable, and placed within view at the termination point on each end. Outlet labels will be the manufacturer’s labels provided with the outlet assembly. The specific nomenclature for labels shall follow West Ada School District labeling Scheme.

D. Station Faceplate and Patch Panel Labeling. Each station outlet terminal shall be identified and marked on the patch panel as described below:

E. All devices that are connected to the network but use a biscuit instead of a wall jack that prevents the user from seeing the jack information w/o having to unmount the device such as wireless access points clock, speakers, and cameras need to be labeled clearly on the device with the IDF and patch panel information. The labeling font need to be large enough that it can be read by a person who may be ground level but the device is mounted on a wall or ceiling.
Labeling of comm room example
3.7 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.8 INSTALLATION OF PATHWAYS

A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A.

B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.

C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

E. Install manufactured conduit sweeps and long-radius elbows whenever possible.

F. Pathway Installation in Communications Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits 3 inches (76 mm) above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.9 FIRESTOPPING
A. Comply with requirements in Division 07 Section "Penetration Firestopping." Comply with TIA/EIA-569-A, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.10 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:


2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

3. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

C. Testing UTP Cables and Links

1. All UTP cabling will be certified to meet and or exceed the specifications as set forth in the Link Performance Testing Specifications in the Transmission Performance Specifications for Field-Testing of Unshielded Twisted-Pair Cabling Systems, TIA/EIA 568-B.2-1 (current draft) using a level III field tester. Certifications shall include the following
parameters for each pair of each cable installed (parameters shall be tested up to a frequency sweep of 500 MHz):

a. Wire map (pin to pin connectivity)

b. Length (in feet)

c. Attenuation

d. Near End Crosstalk (NEXT)

e. Far End Crosstalk (FEXT)

f. ELFEXT

g. Attenuation/Crosstalk Ration (ACR)

h. Return Loss

i. Propagation Delay

j. Delay Skew

k. Test equipment shall be able to provide an electronic soft copy and printed hard copy record of these tests. Test equipment shall be a Fluke Networks DTX-1200 or Fluke Networks DTX-1800 tester.

l. Owner reserves the right to hire an independent testing company to spot check the test results. If the results vary more than 10% from the results submitted by the Contractor, the Contractor will be required to prove their results are correct or will need to retest the entire system.

m. Testing must be conducted using a Fluke tester (DTX1800 or higher) and cable type must be entered into test parameters (2091 or 1091) to guarantee correct NVP is being used during testing.

2. Optical Fiber Cable Tests:

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568.C. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Link End-to-End Attenuation Tests:

1) Horizontal and Singlemode backbone link measurements: Test at 1310 and 1550nm bidirectional according to TIA/EIA-568.C, Method B, One Reference Jumper.

2) The Optical Fiber Link Loss Budget used for testing the Fiber backbone cabling should be determined by utilizing the CommScope Link Loss Calculator. This value should be entered into the Testing Equipment to accurately test the fiber backbone.

D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Immediate fix of that cable and apparatus shall be done if it fails the test. Do not move onto next cable until that failed cable has a passing test.
H. Prepare test and inspection reports.

3.12 AS-BUILT DRAWINGS

A. The Cabling Contractor shall provide three sets of As-Built drawings to the Owner, which clearly indicates:

1. A floor plan of the building showing the AS-Built location of data drops, conduit runs, and terminal cabinets.

2. A listing of all stations with each data drop clearly identified according to system labeling scheme. Show all ports and punch downs.
Single Rack Configuration:
Dual Rack Configuration:

DATA Network

WIAP

Interconnect

Security
END OF SECTION 271300
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fire alarm systems.

B. Related Sections include the following:

1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

A. Addressable system; multiplexed signal transmission dedicated to fire alarm service with horn/strobes. This system shall be capable of handling the entire fire system requirements of the building including, but not limited to fire sprinkler monitoring, magnetic door hold open equipment, HVAC equipment, Elevator Recall and horn/strobes throughout the entire building.

1.5 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 72.

B. Premises protection includes Fully Sprinkled Type Occupancy.

C. Fire alarm signal initiation shall be by one or more of the following devices:

2. Heat detectors.
3. Flame detectors.
4. Smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow.
7. Fire extinguishing system operation.
8. Fire standpipe system.

D. Fire alarm signal shall initiate the following actions:

1. Alarm notification appliances shall operate continuously.
2. Identify alarm at the FACP and remote annunciators.
4. Transmit an alarm signal to the remote alarm receiving station.
5. Unlock electric door locks in designated egress paths.
6. Release fire and smoke doors held open by magnetic door holders.
7. Activate voice/alarm communication system.
8. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
9. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
10. Record events in the system memory with ability to be printed.

E. Supervisory signal initiation shall be by one or more of the following devices or actions:

1. Operation of a fire-protection system valve tamper.
2. Operation of any duct detectors or induct detectors.

F. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at the FACP.
4. Ground or a single break in FACP internal circuits.
5. Abnormal ac voltage at the FACP.
6. A break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at the FACP or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
10. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

G. System Trouble and Supervisory Signal Actions: Annunciate at the FACP and remote annunciators. Record the event on system memory with ability to be printed.

1.6 SUBMITTALS
Prior to the start of work, the contractor shall provide a complete and comprehensive submittal for review by the engineer. The submittals shall be prepared by a NICET III certified, factory trained personnel. This person shall provide to the engineer of record the proof of NICET certification and proof of factory training if requested. Factory training means that this person
has received training at the factory. These are to describe the proposed system and its equipment. Failure to provide a complete submittal shall be grounds for summary rejection of any incomplete submittal documentation. Contractors who provide re-submittal’s, due to prior rejection shall be subject to a re-review fee, should the Engineer elect to do so. The complete submittal shall include, but not be limited to, all of the following material:

A. Power Calculations

1. Battery capacity calculations shall be a minimum of 125% of the calculated requirement.
2. Supervisory power requirements for all equipment.
3. Alarm power requirements for all equipment.
4. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst case condition plus 25% spare capacity.
5. Voltage-drop calculations for wiring runs demonstrating worst case condition.

B. Complete manufacturers catalog data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements.

C. Complete drawings covering the following shall be submitted by the contractor for the proposed system. Floor plans in a CAD compatible format showing all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used. Floor plans will be prepared at 1/8” scale.

D. A complete proposed system database including a description of all logic strings, control by event programming and point identification labels on a flash drive and in a formatted printed form, as required for offsite editing, shall be submitted for evaluation by the owner.

1. The program shall include all required interactive control functions between the local network systems and the methods for implementing these actions.

E. Provide the address, telephone number, and contact person(s) of the manufacturer’s local service facility for normal and off-hour warranty issues.

F. If the fire alarm system and its equipment are supplied by a manufacturer's distributor, as part of the submittal documentation, the manufacturer shall provide, on its corporate letterhead, a "letter of support". Said "letter of support" shall state that, when in the opinion of the Engineer, the distributor's efforts require back-up and/or assistance, the manufacturer shall provide, at no cost to the Owner, all required technical support during the installation phase and for a one (1) year guarantee period starting on the date of final acceptance by the owner and the authority having jurisdiction. If said "letter of support" is not submitted, the manufacturer's equipment will be deemed unacceptable and shall be grounds for summary rejection.

G. Provide a fire alarm system function matrix. Matrix shall illustrate alarm output events in association with initiating devices input events. Matrix shall represent a summary of the installed system alarm, supervisory and trouble functions. Include any and all departures, exceptions, variances or substitutions from these specifications and/or drawings at the time of bid. Failure to provide this requirement shall be cause for summary rejection of submittal documents where additional departures are discovered. (See NFPA-72 for minimum matrix requirements)
H. For each system control panel and/or transponder panel, provide panel ampere loading during both normal and alarm modes, with time calculations to substantiate compliance with battery back-up power requirements (battery Ampere-Hour capacity), described elsewhere in these specifications.

I. For each system control panel and/or transponder panel, provide written schedule of active and spare addresses provided on each addressable circuit to substantiate compliance with circuit usage/spare requirements, described elsewhere in these specifications.

J. For each system control panel and system transponder notification appliance circuit provide a written schedule of spare capability in amperes available for future possible use.

K. Provide manufacture’s printed product data, catalog pages and descriptions of any special installation requirements and/or procedures. Drawings depicting any special physical installation requirements shall show physical plans, elevations, all dimensions, conduit entry, minimum access clearances and any other details required.

L. Provide shop drawings as follows:
   1. Drawing or catalog page showing actual dimensions of the main FCS.
   2. Drawing(s) or catalog page(s) showing actual dimensions of any additional system control panels, and/or battery cabinets.
   3. Drawing or catalog page showing actual dimensions of the remote annunciator(s).
   4. Single line riser diagram showing, all equipment, all connections and number and size of all conductors and conduits.
   5. Provide samples of various items when so requested by the architect/engineer.

M. The fire protection contractor shall provide copies of certification for service technician’s formal training by the system manufacture. As a minimum, certification documents shall indicate training dates, systems qualified, name of individual certified and current status.

N. Product Data: For each type of product indicated within 90 days of notice to proceed.

O. Within 30 days of notice to proceed, the contractor shall submit a programming printout and digital copy of the program to the Engineer for review.

P. Qualification Data: For Installer: NICET Level II certification within 30 days of notice to proceed.

Q. Field quality-control test reports: provide test reports 10 days prior to final test requirements.

R. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

S. Documentation:
   1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.

   a. Hard copies on paper to Owner, Architect, and authorities having jurisdiction.
   b. Electronic media may be provided to Architect.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Personnel certified by NICET as Fire Alarm Level III.

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

D. 30 days after award of bid, the contractor shall conduct a meeting with the owner, owners representative, the Engineer and the architect to discuss compliance of the specifications and drawings.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Initiating Appliances: Quantity equal to 10 percent of amount of each type installed, but not less than 1 unit of each type.
   2. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but not less than 1 unit of each type.
   3. Keys and Tools: One extra set for access to locked and tamper proofed components.
   4. Audible and Visual Notification Appliances: One of each type installed.
   5. Fuses if applicable: Two of each type installed in the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

   1. Existing FACP and Equipment:
      a. Siemens
   2. Wire and Cable:
a. Comtran Corporation.
b. Helix/HiTemp Cables, Inc.; a Draka USA Company.
c. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
d. West Penn Wire/CDT; a division of Cable Design Technologies.

3. Audible and Visual Signals:
   a. Must be compatible with the existing system and devices

2.2 FACP

A. General Description:
   1. Modular, power-limited design with electronic modules, UL 864 listed.
   2. Addressable initiation devices that communicate device identity and status.
      a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at the FACP.
      b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
   3. Addressable control circuits for operation of mechanical equipment.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

   1. Annunciator and Display: Liquid-crystal type, three line(s) of 80 characters, minimum.
   2. Keypad: Arranged to permit entry and execution of programming, display, and control commands; and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Circuits:
   1. Signaling Line Circuits: NFPA 72, Class B.
      a. System Layout: Each signaling line circuit shall be loaded no more than 80% capacity.
   2. Notification-Appliance Circuits: NFPA 72, Class B.
   3. Actuation of alarm notification appliances, annunciation, smoke control, shall occur within 10 seconds after the activation of an initiating device.
   4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.

D. Smoke-Alarm Verification:
   1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
   2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
   3. Sound general alarm if the alarm is verified.
4. Cancel FACP indication and system reset if the alarm is not verified.

E. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41.

F. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

G. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators, after initiating devices are restored to normal.
   1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
   2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
   3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

H. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

I. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and control of changes in those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and make a print-out of the final adjusted values on the system printer.

J. Service Modem: Ports shall be RS-232 for system printer and for connection to a dial-in terminal unit.
   1. The dial-in port shall allow remote access to the FACP for programming changes and system diagnostic routines. Access by a remote terminal shall be by encrypted password algorithm.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.
   1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
   2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM CIRCUIT."

L. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
2. Battery and Charger Capacity: Comply with NFPA 72.

M. Surge Protection:

1. Install surge protection on normal ac power for the FACP and its accessories. Comply with Division 26 Section "Transient Voltage Suppression" for auxiliary panel suppressors.
2. Install surge protectors recommended by FACP manufacturer. Install on all system wiring external to the building housing the FACP.

N. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE ALARM BOXES

A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.

2.4 SYSTEM SMOKE DETECTORS

A. General Description:
1. UL 268 listed, operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
3. Multipurpose type, containing the following:
   a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
   b. Heat sensor, combination rate-of-rise and fixed temperature.
4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
7. Where noted on drawings provide a welded wire screen protective cover.
8. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
   a. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:
   1. Sensor: LED or infrared light source with matching silicon-cell receiver.
   2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

C. Duct Smoke Detectors:
   1. Photoelectric Smoke Detectors:
      a. Sensor: LED or infrared light source with matching silicon-cell receiver.
      b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.
   2. UL 268A listed, operating at 24-V dc, nominal.
   3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
   4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
      a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.
   5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
   7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
   8. Each sensor shall have multiple levels of detection sensitivity.
   9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.

2.5 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
2. Where called for on plans to have a wire guard, provide and install a welded wire screen guard of appropriate size. Polycarbonate or other transparent protective covers are prohibited.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn.

C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-(25-mm-) high letters on the lens.

1. Rated Light Output: as indicated.
2. Strobe Leads: Factory connected to screw terminals.
3. Where called for on plans to have a wire guard, provide and install a welded wire screen guard of appropriate size. Polycarbonate or other transparent protective covers are prohibited.

2.6 SPRINKLER SYSTEM REMOTE INDICATORS

A. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.7 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.

B. Material and Finish: Match door hardware.

2.8 REMOTE ANNUNCIATOR

A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.

B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LED’s permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall where indicated to a circuit-breaker shunt trip for power shutdown and to release doors.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Listed and labeled according to UL 632.

B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising 2 lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.

C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.

D. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.11 GUARDS FOR PHYSICAL PROTECTION

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by manufacturer of the device.
2. Finish: Paint of color to match the protected device.

2.12 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG size as recommended by system manufacturer.
1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.


   1. Line-Voltage Circuits: No. 12 AWG, minimum.

D. All wire and cable shall be installed in conduit.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Smoke or Heat Detector Spacing:

   1. Smooth ceiling spacing shall not exceed [30 feet (9 m)] .
   2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
   3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

B. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.

C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

D. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

E. Audible Alarm-Indicating Devices: Install between 80” and 96” above finished floor, this height is to the visual lens portion of the device, or on ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

F. Visible Alarm-Indicating Devices: Install integral to each alarm horn if noted.

G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

H. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

   1. NECA 1.
   2. TIA/EIA 568-A.
B. Wiring Method: Install wiring in metal raceway according to Division 26 Section "Raceways and Boxes."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour fire-rated fire alarm cables, NFPA 70 Types MI and CI, is not permitted.
3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 26 Section "Electrical Identification."

B. Install instructions frame in a location visible from the FACP.

C. Paint power-supply disconnect switch red and label "FIRE ALARM CIRCUIT."

D. The location of the branch-circuit overcurrent protective devices shall be permanently identified at the fire alarm control unit.
3.4 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to witness field tests and inspections and prepare test reports. The contractor shall provide all personnel for this test. There shall be two tests, one prior to the Fire Marshall test and one with the Fire Marshall.

C. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.
3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
   a. Detectors that are outside their marked sensitivity range shall be replaced.
5. Test and Inspection Records: Prepare according to NFPA 72.

D. At no time shall the contractor make changes to the documents without written permission from the Engineer.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 1 Section "Closeout Procedures and Demonstration and Training."

END OF SECTION 283100