Project Manual:

Ricoh Copy Center Project
Cunningham Library
510 North 6 ½ Street
Terre Haute, Indiana 47809

Project Designer/Manager:

Indiana State University

Department of Facilities Management
951 Sycamore Street
Terre Haute, Indiana 47809
812-237-8100

Bid Number B0028697

RICOH COPY CENTER, CUNNINGHAM MEMORIAL LIBRARY
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NOTICE TO BIDDERS

Sealed proposals are requested for the Ricoh Copy Center Cunningham Memorial Library, Bid Number B0028697. Proposals will be received for the above contract at the Office of the Procurement Department, Indiana State University, Facilities Management and Procurement Building, 951 Sycamore Walk, Terre Haute, Indiana 47809, until 2:00pm Local Time on January 16, 2026. There will be no in-person Public Bid Opening. The Bids will be opened at 2:15pm on the due date and read aloud via Teams conference call. For conference call access call 812-228-8187 and enter conference ID: Will be Issued in Addendum followed by #.

Bidding Documents may be downloaded from the ISU Plan Room at http://www.indstateplanroom.com/ on **December 17, 2025** for $5.50 per person/download which covers all downloads for that particular Project. Bidders must register for a free account the first time they access the website. Bid Documents may be ordered for purchase on CD, for $7.50 per CD, or on paper copy at applicable printing costs from Rapid Reproductions, Inc.,129 South 11th Street, Terre Haute, IN 47807 (812-238-1681 Toll Free 800-736-7084).

Proposals are to be made on the Bid Form published in the Project Manual, based on Form 96 (Revised), as prescribed by the State Board of Accounts. As a mandatory requirement the Proposal shall be accompanied by a certified check; cashier's check or a Bid Bond (AIA A310) for an amount not less than 5% of the total bid price for Base Bid(s) and all add Alternates. See Section 00 10 10 Instructions to Bidders 3.01 for Bid Bond Requirements

Bidder(s) receiving awards shall be required to provide acceptable surety in the form of a Performance and Labor and Materials Payment Bond for the full amount of the award. Include the cost of all bonds and insurance in the Bid amount.

Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid or on any Application for Payment.

All Bidders must comply with All State and Federal Non-Discrimination laws.

Responsive bidders may not have an active dispute, claim, or litigation with Indiana State University.

Indiana State University reserves the right to accept or reject any Bid and to waive any irregularities in Bidding. Any proposal received after the time fixed herein shall be returned unopened.

No bid may be withdrawn after the opening of Bids without the consent of Indiana State University for a period of One Hundred Twenty (120) days after the time of opening Bids.

There will not be an actual Pre-Bid conference meeting for the Project. A copy of a Pre-Bid Information sheet will be included with the Bidding Documents. Bidders shall review the information sheet and the contained information will become a part of the Bidding Documents.

Pre-Bid site visits have been scheduled at 11:00am on January 6th, 2026 at the Cunningham Memorial Library, 510 North 6 1/2 Street, Terre Haute, Indiana 47809.

Contract Award shall be to a Single Prime Bidder for all single Base Bid project work or the Contract Award may be to multiple Single Prime Bidders for multiple Base Bid Package project work. The prime Bidder(s) shall be an experienced and qualified Contractor(s) having successfully completed a minimum of three (3) projects of similar size and scope. The Bid form for this Project requires the Bidder to submit evidence of successful installation of similar projects (minimum of three projects), including customer information, scope, dates, Contract dollar amounts. With their Bid the Bidder shall submit their most current audited financial statement and vendor trade credit references as evidence of financial capability to perform the work.

All questions relating to this Project shall be addressed to:

Scott Tillman, Department of Facilities Management
Phone 812-237-8198 E-mail scott.tillman@indstate.edu

NOTICE TO BIDDERS

INDIANA STATE UNIVERSITY BOARD OF TRUSTEES

By: Seth Hinshaw
Vice President for Finance and Administration, University Treasurer
Indiana State University

END OF SECTION 00 10 00

PART 1- INSTRUCTIONS TO BIDDERS

1.01 GENERAL

A. Bidders shall carefully read the Notice to Bidders with regard to preparation of proposals, which includes the date and place for receiving proposals. See PART 3 of this Section 00 10 10 Instructions to Bidders for a complete list of the required forms for Bidding.

B. All Bidders shall fully inform themselves of the conditions under which the work is to be performed, the site of the work, the obstacles that may be encountered, and other relevant matters concerning the work to be performed.

C. The Contractor shall begin Work within seven (7) days after Award with all Work substantially completed by September 1, 2025. Final closeout shall be within thirty (30) calendar days thereafter. A warranty walk-thru may be held eleven (11) months from the date of substantial completion.

D. No Bidder, after being awarded the contract, shall be allowed any extra compensation for reason of their failure to fully inform themselves, prior to their Bidding, of all requirements of the Contract Documents, the Drawings, and Specifications.

E. If any Bidder for the proposed contract is in doubt as to the true meaning of any part of the Drawings, Specifications or their proposed Contract Documents, they may submit to the Owner written request for any interpretation thereof. The Bidder submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by an Addendum duly issued. A copy of such Addendum will be posted to the ISU Plan Room and e-mail notification sent to each registered plan holder (see 1.07 of this Section). Such Addendum, if any, issued before submission of the Bids, shall be taken into account and included in the proposal.

F. Any Bidder may withdraw their Bid at any time prior to the scheduled time for the receipt of bids.

G. No Bidder may withdraw their Bid or proposal for a period of One Hundred Twenty (120) calendar days after date and time set for opening Bids.

H. It is understood that the Owner reserves the right to waive any irregularities in Bidding and to accept or reject any or all Bids.

I. It is further understood on Bids with multiple Bid Packages the Owner reserves the right to selectively Award individual Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Bid Packages.

1.02 EXAMINATION OF SITE AND BIDDING DOCUMENTS

A. The site shall be carefully examined prior to bidding to ascertain the location of the work, existing conditions, and all other matters which may affect the work under this Contract. Each Bidder by making their Bid represents that they have visited the site and familiarized themselves with the local conditions under which the Work is to be performed.

B. The Bidding Documents shall be carefully examined to ascertain the character, quality and quantity of the work to be performed, of materials and items to be furnished, of equipment and facilities needed during construction, of utilities and of all other matters which may affect the work under the Contract. Each Bidder by making their Bid represents that they have read and fully understands the Bidding Documents.

1.03 PRE-BID CONFERENCE

A. There will not be an actual Pre-Bid conference. A pre-bid site visit will be held to allow Bidders' to visit the site. All questions, even if asked and answered at the pre-bid site visit, shall be submitted in writing via e-mail to the Project main contact and Owner.

B. An Addendum will be issued confirming any information conveyed at pre-bid site visit and no verbal response tendered during pre-bid site visit shall have legal standing unless so confirmed by Addendum.

C. Additional site visits may be arranged with the Project's Main Contact or Owner's Main Contact.

1.04 BIDDING QUESTIONS

A. Questions regarding the Bidding Documents and Project shall be submitted in writing via e-mail to the Project main contact and Owner. An Addendum will be issued to respond to all questions received. No verbal or direct e-mail response shall have legal standing unless so confirmed by Addendum.

B. The last day for questions to submitted shall be three (3) business days prior to the scheduled date for the receipt of Bids. Any questions submitted after that date may not receive consideration.

1.05 EXECUTION OF AGREEMENT

A. For all Projects the forms of agreement which the successful Bidder, as Contractor, will enter into will be an ISU Award Letter, an ISU Purchase Order and a Contract for Construction. Prior to issuance of the Purchase Order the Contractor shall provide to the Director of Purchasing the Labor and Material Performance Bond, their most current financial statement and vendor trade credit references as evidence of financial capability to perform the work and the policies of insurance or insurance certificates as required by the Contract Documents and listed in the Award Letter. All Bonds and Insurance shall have an A.M. Best rating of not less than an "A". Once all the required paperwork has been received by ISU Purchasing and the Purchase Order issued, an electronic PDF copy of the Contract for Construction Between Indiana State University and Contractor, will be e-mailed to the Contractor for their signature and return to the Department of Facilities Management Contract Administrator for forwarding to the Senior Vice President for Finance and Administration for Owner signature. A fully executed copy of this Contract will be returned to the Contractor via e-mail for their files.

B. Time Limits for Execution of Agreement.

1. The successful Bidder shall supply the required paperwork (their Financial Statement (if not supplied with their Bid), Certificate of Insurance and their Performance and Payment Bond) to the ISU Purchasing Department within ten (10) calendar days after receipt of the ISU Award Letter.

2. The successful Bidder shall within seven (7) calendar days after receipt of the Contract for Construction Between Indiana State University and Contractor enter into the written Contract to perform the work in accordance with the Drawings and Specifications by signing and returning the Contract to the Department of Facilities Management Contract Administrator for forwarding to the Senior Vice President for Finance and Administration for Owner's signature and return to the Bidder.

C. In the case a Bidder whose Bid is accepted, fails to perform their Bid by providing the required paperwork within ten (10) calendar days after receipt of the Award Letter and entering into the written Contract with the Owner within seven (7) calendar days after receipt, then this failure may be cause for their certified check, draft or Bid Bond, and the proceeds thereof, to remain the absolute property of the Owner, as liquidated damages, it being impossible to estimate the amount of damages such failure would occasion.

1.06 INDEMNIFICATION

A. Bidders, in consideration of the privilege of Bidding, specifically waive all rights both legal and equitable which they have or might be construed to have against Indiana State University because of any action taken in accepting or rejecting bids and proposals, for themselves, and /or for subcontractors, suppliers and/or manufacturers, who may file an action based on any such acceptance or rejection. Bidders shall be liable for any resultant reasonable attorney fees and expenses incurred by Indiana State University.

1.07 ADDENDA

A. All Addenda for the Project will be posted on the ISU Plan Room at: http://www.indstateplanroom.com/. Addenda may be downloaded at no cost to registered plan holders.

B. A Bidder must register for a free account the first time they access the ISU Plan Room website.

C. The Bidder will receive an e-mail notifying that an Addendum is available for download from this site. The Bidder is advised to periodically check this link in the event an e-mail fails to deliver.

1.08 SUBSTITUTIONS PRIOR TO BID

A. Requests for substitution of any material, construction, equipment and methods named or described in the Specifications, on the Drawings and any Addenda issued shall be submitted in writing to the Architect/Engineer and Owner a minimum of seven (7) calendar days prior to Bidding. Complete support documentation shall be provided that the item to be substituted is equal to or exceeds the material, construction, equipment or methods named or described in the Specifications, on the Drawings and any Addenda issued with the request for substitution. It is solely at the discretion of the Architect/Engineer and the Owner to allow any requests for substitution.

B. Should it be determined after Award of the Bid that the Bidder based their Bid on any material, construction, equipment and methods not named or described in the Specifications, on the Drawings and any Addenda issued as approved for substitution prior to Bidding shall be disallowed and the material, construction, equipment and methods named or described in the Specifications, on the Drawings and any Addenda issued shall be provided at no additional cost to the Owner.

PART 2 - SUBCONTRACTORS, SUPPLIER AND MANUFACTURER'S BIDS TO BIDDERS

2.01 SUBCONTRACTOR, SUPPLIER AND MANUFACTURE BUNDLING OF PRICES TO PROSPECTIVE BIDDERS

A. Subcontractors, Suppliers and Manufacturers are permitted to bundle quote prices to Bidders however these bundled prices may not be used to withhold providing individual pricing to a Bidder for bundled items when requested by a Bidder to provide individual pricing. No subcontractor or supplier shall make it a condition of their bid that another part of the project be awarded to them.

B. Failure to provide individual pricing upon Bidder's request may be cause to disqualify a Subcontractor or Supplier and Manufacturer from Indiana State University Projects.

PART 3- EXECUTION FORMS FOR BIDDING

3.01 BID BOND

A. A certified or cashier's check or Bid Bond is a mandatory requirement to be submitted with the Bid and shall be based on not less than five (5) percent of the Bid amount total of the Base Bid(s) and all add Alternates.

B. The Bid bond shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties

as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. The Bid Bond shall be obtained from surety or insurance company that is duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. In addition to appearing on Circular 570 U.S. Dept. of the Treasury, such Surety or insurance company shall maintain an A.M. Best's Rating of not less than "A.

C. Failure to submit an acceptable Bid Bond with the Bid shall disqualify a Bidder.

3.02 BIDDERS FINANCIAL STATEMENT

A. With their Bid the Bidder shall submit their most current independently audited or reviewed financial statement and vendor trade credit references as evidence of financial capability to perform the work.

B. Failure to submit the Bidder's financial statement may be cause to disqualify a Bidder.

3.03 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION (SECTION 00 10 20 OF PROJECT MANUAL)

A. This certificate is required by the regulations implementing Executive Order 12549 Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participants' responsibilities. The regulations were published as Part V11 of the May 26, 1988 Federal Register (pages 19160-19211).

B. Submit at time of Bid. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.04 MBE/WBE/VBE PARTICIPATION PLAN. (SECTION 00 10 40 OF THE PROJECT MANUAL)

A. See Section 00 10 30 MBE/WBE/VBE COMPLIANCE INSTRUCTIONS for full details on submission of the Participation Plan.

B. This Plan must be submitted at time of Bid by **all Bidders**. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.05 MANDATORY TIER II REPORTING REQUIREMENT FOR PROJECTS EQUAL TO OR GREATER THAN $150,000.00. (Note: this form may not be included in all Project Manuals)

A. MBE/WBE/VBE utilization in the performance of this Contract must be reported with each Application for Payment using the ISU Business Diversity Spend Reporting Form for Construction/Renovation/Facilities Repair Projects (see included: Tier II Spend Report Form.xlsx.)

B. Compliance with Owner's Mandatory Tier II Reporting Requirement is a condition for the approval of an Applications for Payment.

C. An electronic copy in Excel format will be included with the Award Letter when applicable.

3.06 BIDDER'S CERTIFICATION OF A**U**THORIZED EMPLOYMENT (SECTION 00 10 45 OF THE PROJECT MANUAL)

A. Bidder must certify at time the of Bidding that they have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents In Section 00 20 11 Amendments to General Conditions Article 13, subparagraph 13.1.7.3 and its subparagraphs

B. Submit at time of Bid. Failure to submit with the Bid may be cause to disqualify a Bidder.

3.07 BID FORM (SECTION 00 20 00 OF THE PROJECT MANUAL)

A. In order to receive consideration, make all Bids in strict accordance with the following:

1. Proposals shall be submitted only on the form furnished, a copy of which is bound into and forms a part of this Project Manual, and which will become a part of the Purchase Order Contract of the successful Bidder (use a photocopy of the Bid Form herein).

2. Proposals shall be completely and correctly filled out using ink or typewriter, with signatures in ink.

3. Prices, except unit prices and percentages, shall be stated both in figures and in writing. In the event of a discrepancy between writing and the figures, the written amount shall govern.

4. Proposals shall be signed by the Bidder, by a partner, or a duly authorized officer for a corporation, and shall give the Bidder's business address and telephone number. Failure to sign the Bid form may be cause to disqualify a Bid.

5. Proposals submitted by non-Indiana corporations shall be accompanied by a certificate of existence issued by the Indiana Secretary of State.

6. Any interlineation, alteration or erasure of the published Bid Form may be grounds for rejection of the proposal. Proposal shall contain no recapitulation of the work to be done.

7. Proposals shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Sections for substitution request requirements.

B. Modification of proposals already submitted will be accepted by letter, fax or telegram if received by the Owner prior to the date and hour set for opening of proposals.

C. Each Bid shall be addressed to the Owner, and shall be delivered to the Office of the Director of Purchasing at the address given in the Notice to Bidders on or before the day and hour set for opening of Bids. Each Bid shall be enclosed in a sealed envelope bearing the title of the Project, the name of the Bidder, and the date and hour of the Bid opening. It is the sole responsibility of the bidder to see that their bid is received on time.

3.08 ADDENDA

A. Indicate receipt of Addenda on the Bid Form in the spaces provided for acknowledgement.

B. Failure to indicate receipt may be cause to disqualify a Bid.

3.09 BID FORM - BASE BID(S)

A. Base Bid(s) shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Section for substitution request requirements.

B. On Bids with multiple Base Bid Packages the Owner reserves the right to selectively Award individual Base Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Bid Packages.

3.10 BID FORM - ALTERNATE BID(S)

A. Each Bidder, in addition to submission of the Base Bid, shall submit a Bid for any Alternate(s) as called for (if any). Failure to submit said Alternate Bid(s) shall be sufficient cause for the Owner to reject any proposal in its entirety. Also the Owner may consider the Alternate Bid in awarding of a Contract, but is under no obligation to accept any Alternate Bid.

B. Proposals shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding. See item 1.08 of this Section for substitution request requirements.

3.11 BID FORM – ALLOWANCES

A. Allowances (if any) shall be included in the applicable Bid (Base Bid(s) or Alternate Bid(s)) as called for in the Allowance Section of the Bid Form and/or Section 01 23 60 Allowances.

B. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to an Allowance.

C. Any unused portion of an Allowance shall be returned to the Owner at Contract Closeout.

3.12 COMPLIANCE WITH LAWS

A. The Bidder shall comply with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Indiana Code 5-16 and all provisions required thereby to be included herein are hereby incorporated by reference. Bidder warrants Contractor and any subcontractors shall obtain and maintain all required permissions, permits, licenses, registrations, accreditations, certifications, and approvals, and shall comply with all employment, labor, EEOC, E-verify, health, safety, and environmental statutes, rules, or regulations related to the products and services offered under this agreement. Bidder and any principals of the Contractor certify compliance with the requirements of Indiana Code § 5-16-1-9 Application of Indiana Code 5-22-16.5 (e.g. Company has not and will not participate in any investments or activities in Iran and refrains from engaging in any new investments or activities in Iran).

B. Submission of the signed Bid Form indicates compliance.

3.13 NON-COLLUSION AFFIDAVIT

A. The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

B. Submission of the signed Bid Form indicates compliance.

3.14 NON-DISCRIMINATION

A. The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract.

B. Submission of the signed Bid Form indicates compliance.

3.15 CERTIFICATION OF UNITED STATES STEEL PRODUCTS

A. The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

B. Submission of the signed Bid Form indicates compliance.

3.16 BID FORM - APPENDIX A SUBCONTRACTOR AND SUPPLIER/MANUFACTURERS LISTS

A. The Prime Contractor (Bidder) shall list all Subcontractors and Suppliers/Manufacturers called for in Appendix A of the Bid Form at the time of Bid Submission. Failure to provide this information may be sufficient cause to disallow a Bid.

B. **The Prime Contractor (Bidder) shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix "A" submitted at the time of Bid. It is the Prime Contractor's (Bidder's) responsibility to assure they have listed the correct Subcontractors, Suppliers, Materials and Equipment on their Bid Form. THERE SHALL BE NO CHANGES PERMITTED TO THESE LISTS.**

1. Exception: If the Owner determines the Subcontractors, Suppliers, Materials or Equipment are not acceptable, the Owner shall notify the Prime Contractor (Bidder) in writing within two (2) working days after receipt of Bids of the unacceptable Subcontractor(s), Supplier(s), Material(s) and/or Equipment(s).

3.17 BID FORM - APPENDIX B UNIT PRICES

A. Each Bidder shall submit pricing for Unit Prices as called for (if any) in Appendix B. Failure to submit said pricing may be sufficient cause for the Owner to reject any proposal in its entirety. Also the Owner may consider the Unit Pricing in awarding of a Contract.

B. Unit Prices shall be based only on the material, construction, equipment and methods named or described in the Specifications, on the Drawings, and any Addenda issued prior to Bidding.

C. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

3.18 BID FORM - APPENDIX C

A. By 2:00pm on the next business day after receipt of Bids the Bidder shall submit, a wage rate schedule for the workers of the Prime Bidder and all major Subcontractors involved in the Work. The wage rate shall include the worker's hourly rate plus all fringe benefits to be paid to the worker.

B. A major Subcontractor is defined as any Subcontractor whose portion of the Bid is in excess of $250,000 or 20% of the total Bid whichever is less.

C. Failure to submit this wage rate schedule within the allotted time may be sufficient cause to disallow a Bid. The wage rates provided may be used as a basis for Award of the Bid.

D. The Owner reserves the right to require certified payroll records to be provided to verify the wage rates listed on the wage rate schedule are accurate.

END OF SECTION 00 10 10

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00 10 20

CERTIFICATION REGARDING SUSPENSION, DEBARMENT, INELIGIBILITY AND VOLUNTARY EXCLUSION

This certificate is required by the regulations implementing Executive Orders 12549 and 12689, Uniform Guidance 2 CFR 200.213 and 2 CFR 180 sections regarding Suspension and Debarment

Is your organization, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

Are any of your subcontractors, or its principals, suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction, by any Federal department or agency? ☐ Yes ☐ No

_____
Your Company's Name

_____
Signature

_____
Print Your Name

_____
Date

END OF SECTION 00 10 20

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00 10 40
MBE/WBE/VBE PARTICIPATION PLAN

Project Name _____

Bid Number _____ Bid Date _____

This Form must be completed by all Bidders and submitted with the Bid. **Failure to submit may be cause to reject the Bid.**

Check if Bidder is an MBE, WBE or VBE

Bidders Firm _____ MBE ☐ WBE ☐ VBE ☐

Address _____

City/State/Zip _____

Phone _____

E-mail _____

The following certified minority, women and/or veteran -owned firms will be participating in the project according to the following schedule. Indicate whether each firm is an MBE, WBE or VBE by selecting the MBE, WBE or VBE box below.

1. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

2. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

3. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

4. _____ _____ _____ _____
FIRM MBE ☐ WBE ☐ VBE ☐ TRADE AMOUNT % OF TOTAL BID

_____ _____ _____
CONTACT NAME PHONE E-MAIL

If more space is need attach additional sheet

If no MBE, WBE or VBE contractors are listed above please indicate reason(s) why:

☐ Unable to locate any MBEs, WBEs or VBEs.

☐ Unable to secure competitive pricing from any MBEs, WBEs or VBEs.

☐ Other reasons, please describe: _____

MBE/WBE/VBE PARTICIPATION PLAN

Describe below your efforts to obtain minority, women and veteran's business enterprise participation for this project.
Be sure to attach a copy of all solicitation efforts, e.g., ads that were published or networking events, etc.

_____

_____

_____

_____

List below the MBE/WBE/VBE contractors you individually contacted to request a quote for this project. If all work is to be self-performed and your Firm is not MBE, WBE or VBE list N/A in top left line below.

MBE, WBE, VBE Firms Contacted

Check all that apply:

1. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

2. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

3. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

4. _____ _____ ☐ MBE ☐ WBE ☐ VBE ☐ Not Low ☐ No reply
   FIRM CONTACTED TRADE

   _____ _____ _____
   CONTACT NAME PHONE E-MAIL

If more space is need attach additional sheet

By my signature, I certify that the above statements are true and accurate, all as of the date below. I also understand that any changes to this plan must be approved by Indiana State University and documented by Construction Change Directive.

Agent of Bidder _____

Date_____

END OF SECTION 00 10 40

BIDDER'S CERTIFICATION OF AUTHORIZED EMPLOYMENT

In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

The Prime Contractor shall require their subcontractors who perform work under this Contract to certify to the Prime Contractor that the subcontractor does not knowingly employ or contract with an unauthorized alien and that the subcontractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor. The successful Prime Contractor and its sub-contractors at all levels shall comply with all provisions of the statute or the Contract is subject to cancellation.

I hereby certify that I have read and understand the "Contractor's Certification of Authorized Employment" provision of the Contract Documents In Section 00 20 11 Amendments to General Conditions Article 13, subparagraph 13.1.7.3 and its subparagraphs and that the undersigned and proposed and actual sub-contractors at all tiers shall comply with the provisions of the Statute

On behalf of and as authorized by the Bidder, I affirm and depose that the Bidder and our Subcontractors shall not knowingly employ unauthorized aliens.

_____

(Bidder - Please print full name of your proprietorship, partnership, or corporation)

_____

(Name - Authorized Signing Officer)

_____

(Title)

_____

(Signature)

_____

(Date)

END OF SECTION 00 10 45

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Indiana State University

Office of the Senior Vice President for
Finance and Administration and University Treasurer
Rankin Hall Suite 200
210 North 7th Street
Terre Haute, Indiana 47809

Contract for Construction Between Indiana State University and Contractor

ISU Form CfC101-19
Based on AIA Form A101

AGREEMENT

Agreement for the Contract of Construction made as of the _____ day of _____ in the year of Two Thousand and _____

BETWEEN the Owner
Indiana State University
210 North Seventh Street
Terre Haute, Indiana 47809-0001

and the Contractor:
(Name and address)

Project is:
(Name and location)

The Architect/Engineer is:
(Name and address)

Indiana State University and the Contractor agree as set forth below:

Part 1 – Contract Documents:

The Contract Documents include this Contract for Construction, Conditions of the Contract (General and Special Conditions), Drawings, Specifications, Addenda issued prior to execution of this Contract, other documents listed in this Contract, and Modifications issued after execution of this Contract; these form the Contract, and are as fully a part of the Contract as if attached to this Contract or repeated herein. This Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representation or agreements, either written or oral. An enumeration of the Contract Documents and other Modifications appears in Part 9 of this document.

Part 2 – Work of This Contract:

The Contractor shall execute the entire work as described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others, or as follows:

Part 3 – Start Date and Substantial Completion Date:

3.01 The Start Date shall be as indicated in Section 00 10 10 of the Project Specifications, as listed in any subsequent Addenda, the Notice to Proceed Letter or as listed below:

3.02 The Contractor shall achieve Substantial Completion as indicated in Section 00 10 10 of the Project Specifications, as listed in any subsequent Addenda, the Notice to Proceed Letter or as listed below:

3.03 Substantial Completion maybe adjusted as allowed under Contract Documents or as mutually agreed upon in writing by the Owner and the Contractor.

Part 4 – Contract Sum:

4.01 Indiana State University shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of _____dollars ($_____) subject to additions or deductions as provided in the Contract Documents

4.02 The Contract Sum is based upon the following Alternates, if any, which are described in the Contract Documents and are hereby accepted by Indiana State University:

4.03 Unit Prices, if any, are as follows:

4.04 Allowances

Part 5 – Progress Payments

5.01 Based on an Application for Payment Issued to the Architect/Engineer by the Contractor, Indiana State University shall make progress payments on the account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

5.02 The period covered by each Application for Payment shall be on a regular monthly basis of not less than Twenty Eight (28) calendar days.

5.03 When the Application for Payment is received by the Architect/Engineer, Indiana State University shall make payment within fifteen (15) days after the approval of the Application for Payment by the Architect/Engineer and receipt by Indiana State University Office of Finance and Administration.

5.04 Each Application for Payment shall be based on the schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of Work and shall be prepared in a form and supported by such data as required by the Architect/Engineer and Indiana State University to evaluate and substantiate the accuracy of the Application for Payment. Unless objected to by the Architect/Engineer or Indiana State University this schedule of values shall be the basis for all Contractor Applications for Payment.

5.05 Applications for Payment shall indicate the percentage of completion of each portion of Work as of the end of the application period.

5.06 A Partial Waiver of Lien shall be included with each progress Application for Payment.

5.07 Subject to provisions of the Contract Documents, the amount of the Application for Payment shall be computed as follows:

A. Total of all portions of Work indicted on the schedule of values completed during the application period.

B. Total of verified stored materials indicated on the schedule of values acquired during the application period, provided proof of insurance on the storage facility is submitted.

C. Total of all Change Orders approved or Change Directives issued during the application period.

D. Less a Retainage of ten percent (10%)

E. Subtract the aggregate of previous Applications of Payments made to Indiana State University and subtract amounts, if any, withheld or nullified by the Architect/Engineer.

5.08 The progress payment amount determined by Section 5.06 shall be further modified under the following circumstances

A. Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to ninety five percent (95%) of the Contract Sum; less any amounts the Architect/Engineer or Indiana State University shall determine for incomplete work and unsettled claims.

B. Add, if final completion of the work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Subparagraph 9.10.3 of the General Conditions.

5.09 Reduction or Limitation of Retainage:

A. At the sole written discretion of Indiana State University, if acceptable progress is made, at fifty percent (50%) completion of the Contract Sum the remaining Retainage may be reduced to 0%.

Part 6 – Final Payment

6.01 Final payment, constituting the remaining unpaid balance of the Contract Sum, shall be made to the Contractor by Indiana State University when:

A. The Contract has been fully performed by the Contractor as detailed in the Contract Documents.

B. Approval of the Final Application for Payment is received from the Architect/Engineer.

6.02 No Contractor claims for additional compensation shall be permitted or accepted more than sixty (60) days following the Contractor's submission of their Final Application for Payment.

6.03 Payment shall be made by Indiana State University 61 days after issuance of the of the Contractor's Final Application for Payment and Final Waiver of Lien and final approval from the Architect/Engineer of the Final Application for Payment.

Part 7 – Miscellaneous Provisions

7.01 Where reference is made in this document to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

Part 8 – Termination or Suspension

8.01 The Contract may be terminated by Indiana State University or the Contractor as provided in Article 14 of the General Conditions.

8.02 The Work may be suspended by Indiana State University as provided in Article 14 of the General Conditions.

Part 9 – Enumeration of Contract Documents

9.01 The Contract Documents, except for Modifications issued after execution of this Contract, are enumerated as follows:

A. The agreement is this executed **Contract for Construction Between Indiana State University and Contractor, ISU Form CfC101-20**.

B. The General Conditions are the General Conditions of the Contract for Construction, AIA Document A201.

C. The Supplementary and Other Conditions are those contained in the Project Specifications and are as follows:

See attached Exhibit A Sections 00 and 01

D. The Specifications:

See attached Exhibit A Sections 02-33 as applicable

E. The Drawings:

See attached Exhibit B

F. The Addenda:

Number	Date	Pages

G. Other Documents, if any, forming the Contract Documents are as follows:

Certification Regarding Suspension, Debarment, Ineligibility and Voluntary Exclusion Form, MBE/WBE/VBE Participation Plan, Contractor's Certification of Authorized Employment Form, Award Letter, Purchase Order

This agreement is entered into as of the day and year first written above and is executed by electronic copy in PDF format of which one is delivered to the Contractor, one is delivered to the Architect/Engineer, and the remainder to Indiana State University for distribution to the ISU Purchasing Department, the Office of the Senior Vice President for Finance and Administration and the ISU Department of Facilities Management.

Indiana State University	Contractor
_____	_____
(Signature)	*(Signature)*
Diann E. McKee	_____
(Printed or Typed Name)	*(Printed or Typed Name)*

Exhibit A – Refer to Addenda for any additions, deletions or revisions to these Specification Sections

Exhibit B – Refer to Addenda for any additions, deletions or revisions to these Drawings

BID FORM

BASED ON BID FORM
FORM NO. 96
REVISED FORMAT 1/14/2013

GENERAL BID FOR PUBLIC BUILDING

PROJECT: **Ricoh Copy Center, Bid Number B0028697**

TO: INDIANA STATE UNIVERSITY
BOARD OF TRUSTEES
TERRE HAUTE, INDIANA

FROM:

_____
(Name of Bidder) (Company Name)

_____
(Address)

_____
(City, State, Zip)

PHONE NUMBER _____

DATE: _____

SUBMITTED BY: _____ _____
(Signature) (Title)
The Bidder's signature certifies the Bidder is in compliance with all aspects of the Bid Documents

ADDENDA
The following Addenda have been received. The modifications to the bidding documents noted therein have been considered and all costs thereto are included in the Bid Sum(s).

Addendum #_____	Dated _____
Addendum #_____	Dated _____
Addendum #_____	Dated _____
Addendum #_____	Dated _____

OWNER'S RIGHTS REGARDING ACCEPTANCE OF BIDS
It is understood that the Owner reserves the right to accept or reject any Bid and to waive any irregularities in Bidding. It is further understood on Bids with multiple Base Bid Packages the Owner reserves the right to selectively Award individual Base Bid Packages to multiple Prime Bidders submitting the lowest and best Bids for the individual Base Bid Packages.

BID FORM

TAX EXEMPT

Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid. All other applicable Federal, State and Local taxes shall be included in the Bid sum. Tax exempt certificate available upon request.

OFFER:

Pursuant to and in compliance with 'Instructions to Bidders', and other Bidding Documents prepared by the Indiana State University Facilities Management Department for the above mentioned project, the signer, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the Work within the time stated and in strict accordance with the intent of the proposed Contract Documents, including furnishing bonds, insurance, labor, materials, and to do all the Work required to construct and complete in accordance with the proposed Contract Documents as follows:

BASE BID: Construction of a Sycamore Stadium right field viewing deck per Drawings and Specifications

_____ Dollars ($_____)
(State Amount in Words)

ALTERNATE BIDS

There are no Alternates Requested

ALLOWANCES

1. A $15,000.00 Allowance shall be included in the Base Bid for Unforeseen Conditions and General Construction Contingency. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to this Allowance.

ACCEPTANCE

This offer shall be opened to acceptance and is irrevocable for the period as follows:

- Base Bid and All Alternates - One Hundred Twenty (120) calendar days from the Bid opening date.

If the Owner accepts the Bid within the time period stated above, Bidder will:

- Furnish the required bonds and insurance certificates within ten (10) calendar days of receipt of the Award Letter
- Commence work within seven (7) calendar days of receipt of the Award Letter or as Directed by the Owner.
- Execute the Contract for Construction Between Indiana State University and Contractor within seven (7) calendar days of receipt of the Contract.

The Bidder agrees to coordinate and expedite their work and that if the Award is given within fourteen (14) calendar days from the Bid opening date the work shall be substantially completed as listed in Section 00 10 10 Instructions to Bidders 1.01 C. If the Award is not made within the stated fourteen (14) calendar days then the substantial completion date may be adjusted as allowed by the Contract Documents or as mutually agreed upon in writing by the Owner and Contractor.

COMPLIANCE WITH LAWS

The Bidder shall comply with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Indiana Code 5-16 and all provisions required thereby to be included herein are hereby incorporated by reference. Bidder warrants Contractor and any subcontractors shall obtain and maintain all required permissions, permits, licenses, registrations, accreditations, certifications, and approvals, and shall comply with all employment, labor, EEOC, E-verify, health, safety, and environmental statutes, rules, or regulations related to the products and services offered under this agreement. Bidder and any principals of the Contractor certify compliance with the requirements of Indiana Code § 5-16-1-9 Application of Indiana Code 5-22-16.5 (e.g. Company has not and will not participate in any investments or activities in Iran and refrains from engaging in any new investments or activities in Iran).

NON-COLLUSION AFFIDAVIT

The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid.

NON-DISCRIMINATION

The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract.

CERTIFICATION OF UNITED STATES STEEL PRODUCTS

The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

MBE/WBE/VBE BIDDING:

See Section 00 10 30 for requirements for MBE/WBE/VBE Compliance. Section 00 10 40 MBE/WBE/VBE Participation Plan must be completed by **all Bidders** and submitted with the Bid. Failure to submit with the Bid may be sufficient cause to disqualify a Bid.

EXPERIENCE QUESTIONNAIRE

List similar projects completed by your organization:

1. Contract Amount _____

   Description _____

   Date Completed _____

   Owner_____
   (Name and phone #)

2. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

List similar projects currently under construction by your organization

1. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

2. Contract Amount _____

   Description _____

   Date Completed _____

   Owner _____
   (Name and phone #)

Yes ☐ No ☐ Has your organization ever failed to complete any work awarded it?
If yes, where and why?

_____

_____

_____

Yes ☐ No ☐ Does your Organization have any pending litigation or litigation completed within the past five (5) years initiated by your Organization or the Owner as a result of your work on another Project?

If yes, attach a complete listing, with your Bid, of all such litigation(s) and name(s) of Institutions and/or Parties involved with complete contact information. Failure to submit this information may result in disqualification of your Bid.

Yes ☐ No ☐ Has your Organization been cited for violation of State or Federal regulations within the past twelve months?

If yes, what was the violation and resolution?

_____

_____

List references from firms for which your organization has performed work. Provide firm name, contact person name and phone number.

_____

_____

_____

APPENDICES

The following Appendices are submitted with the Bid:
Appendix A - Subcontractors and Material/Supplier Lists
Appendix B - Unit Prices
Appendix C - Wage Rate Schedule

OATH AND AFFIRMATION

Attested to this ____ day of _____, 202____

By _____

ACKNOWLEDGMENT

State of _____
SS:

County of _____

_____ being duly sworn, deposes and
(Name of person)

says that he/she is _____ of
(Title)

_____ and that the
(Name of organization)
statements contained in the foregoing bid, certification and affidavit are true and correct.

Subscribed and sworn to before me by _____

this _____ day of _____, 202___

_____
Notary Public

My Commission Expires _____

County of Residence _____

SUPPLEMENTS TO BID FORM

TO: INDIANA STATE UNIVERSITY

PROJECT: **Sycamore Stadium Right Field Deck, Bid Number B0028574**

DATE: _____

SUBMITTED BY:
(full name)

(full address)

In accordance with Instructions to Bidders and Bid Form, we include the Supplements to Bid Form for Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

Appendix A - Subcontractor and Manufacturers List (to be submitted at time of Bid)
Failure to submit may be cause to disqualify bid

_____
(Bidder)

_____
(Project)

The following will be performed (or provided) by the Subcontractors and Manufacturers listed herein and coordinated by us.

The Prime Contractor (Bidder) shall list all Subcontractors and Suppliers/Manufacturers called for in Appendix A of this Bid Form at the time of Bid Submission. Failure to provide this information may be sufficient cause to disallow a Bid.

The Prime Contractor (Bidder) shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix "A" submitted at the time of Bid. It is the Prime Contractor's (Bidder's) responsibility to assure they have listed the correct Subcontractors, Suppliers, Materials and Equipment on their Bid Form. THERE SHALL BE NO CHANGES PERMITTED TO THESE LISTS.

Exception: If the Owner determines the Subcontractors, Suppliers, Materials or Equipment are not acceptable, the Owner shall notify the Prime Contractor (Bidder) in writing within two (2) working days after receipt of Bids of the unacceptable Subcontractor(s), Supplier(s), Material(s) and/or Equipment(s).

(Listings begin on next page)

SUBCONTRACTOR LIST
Bidder shall provide the names of all applicable Subcontractors

Description	Subcontractor
General Construction	_____
Concrete Work	_____
Painting Work	_____
Electrical Work	_____
Site Work	_____

SUPPLIER & MANUFACTURERS LIST
Bidder shall provide the names of all applicable Suppliers and Manufacturers

Product Description	Supplier	Manufacturer
Treated Lumber	_____	_____
Composite Decking	_____	_____
Solid Surface Counter	_____	_____
Electrical Panel	_____	_____
WP Boxes/Cover	_____	_____
Interior Lighting	_____	_____
Exterior Lighting	_____	_____

Appendix B – Unit Prices

No Unit Prices Requested

Appendix C – Wage Rate Schedules

By 2:00pm on the next business day after receipt of Bids the Bidder shall submit, a wage rate schedule for the workers of the Prime Bidder and all major Subcontractors involved in the Work. Failure to supply the wage rate schedule(s) as required by the Bidding Documents may be sufficient cause to disallow a Bid

END OF SECTION 00 20 00

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
« »
« »

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

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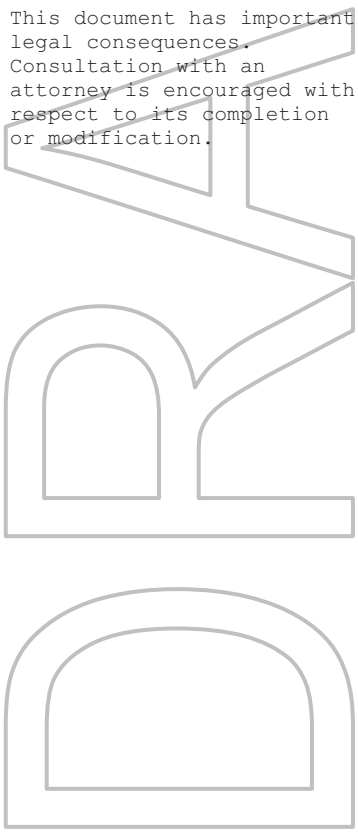
ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available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

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



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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

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facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

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the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

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§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be

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required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

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

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

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§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

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

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§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

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

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§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may

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be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

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.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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

§ 8.2 PROGRESS AND COMPLETION

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

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.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

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

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

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

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

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

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

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stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

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

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

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

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Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

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

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

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

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§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

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of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

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otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 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 use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 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 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 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 caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 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 as fiduciary. 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.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

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Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. 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.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

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§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

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.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

.1 cease operations as directed by the Owner in the notice;

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

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§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

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additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

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PART 1 – GENERAL

1.01 AMENDMENTS TO GENERAL CONDITIONS

A. The General Conditions for this Project shall be the American Institute of Architects' Document A201-2007, "General Conditions of the Contract for Construction, Articles 1 through 15, inclusive, 38 pages, and hereafter referred to as the "General Conditions." Such document is specifically made a part of the Contract Documents.

B. The following amendments shall modify, delete, and supplement the General Conditions. Where any Article, Paragraph, or Subparagraph in the General Conditions is supplemented by one of the following Paragraphs, the provisions of such Article, Paragraph, or Subparagraph shall remain in full force and effect and the supplemental provisions shall be considered as added thereto. Where any Article, Paragraph not so amended, deleted, voided, or superseded shall remain in full force and the order and numbering of subsequent articles, Paragraphs or Subparagraphs shall be changed to read as if in sequence.

C. Refer to other Division 00 documents for additional supplemental requirements.

PART 2 – AMENDMENT ARTICLES

2.01 ARTICLE 1

A. Subparagraph 1.1.1: Amend this Subparagraph by deleting the last sentence beginning with the words "Unless specifically enumerated" and substituting the following sentence: "The Contract Documents shall also include the Notice to Bidders, Instructions to Bidders, Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion, Bid Form, Subcontractors and Materials Listing, Contractor's Non-Collusion Affidavit, and all portions of Addenda relating to Bidding Requirements."

B. Add the following Subparagraph 1.1.7

"1.1.7 ARCHITECT/ENGINEER"

"Where the word Architect is used in the AIA A201-2007 it shall be inferred to also include the Design Engineer(s), e.g. Architect/Engineer, Engineer (for Engineer only Administered Projects).

C. Add the following Section 1.7

"1.7 LITIGATION

1.7.1 All litigation under this Contract must be initiated in Vigo County, Indiana and Contractor consents to the jurisdiction of the Vigo County courts.

1.7.2 Contractor hereby waives its right to a jury trial in any matters litigated in Vigo County.

1.7.3 In any litigation initiated by Contractor, Contractor shall reimburse all attorney's fees and expenses incurred by Owner up to a maximum of $100,000 provided Contractor has presented its claims as required by this Contract and the Owner has made a good faith offer to resolve any dispute prior to litigation. The determination of a 'good faith offer' shall rest solely with the Architect who will render their opinion in writing to Contractor or Owner upon request prior to Contractor initiating litigation or thereafter as requested. The Architect's decision is binding on Owner and Contractor and admissible in court as determinative of this issue.

1.7.4 In any litigation initiated by Owner against Contractor, provided Contractor was given the opportunity to resolve all issues prior to litigation being initiated and failed to do so through a reasonable offer, as determined by the Architect, then Contractor shall be responsible to reimburse all attorney's fees and expenses incurred by Owner for all litigation as well as for all pre-litigation activities engaged in by the Owner for

investigating, evaluating, or mediating any claims, issues, or matters related to Contractor."

2.02 ARTICLE 2

A. Subparagraph 2.1.2: Delete this Subparagraph in its entirety.

B. Subparagraph 2.2.5: Amend this Subparagraph by adding "electronically" after the word Documents in the second line.

2.03 ARTICLE 3

A. Paragraph 3.2: Amend this Paragraph by deleting Subparagraph 3.2.1 in its entirety and replacing with the following new subparagraph 3.2.1 and its subparagraphs:

"3.2.1 By executing the Contract, the Contractor represents to the Owner that:"

"3.2.1.1 The Contractor has a high level of experience and expertise in the business administration construction, management, workplace health and safety supervision and superintendence of projects of similar size and complexity and that it will perform the Work with the care, skill and diligence of such a contractor."

"3.2.1.2 Contractor and, to the best of its knowledge, its subcontractors are financially solvent, able to pay all debts as they mature and have sufficient working capital to complete the Work and all obligations thereunder."

"3.2.1.3 The Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work."

"3.2.1.4 Contractor is authorized to do business in the State of Indiana."

"3.2.1.5 Contractor's execution of the Contract and its performance thereof are within its authorized powers."

"3.2.1.6 Contractor has:"

"3.2.1.6.1 Studied the Contract Documents, understands their provisions and that that they are sufficiently detailed and complete to permit the Contractor to perform the Work in accordance with the Contract Documents, within the Contract Time and for the Contract Sum."

"3.2.1.6.2. Inspected the Project site."

"3.2.1.6.3 Investigated and satisfied itself as to:

"3.2.1.6.3.1 The site and locality where the Work is to be performed and the conditions and difficulties to be encountered, including access thereto."

"3.2.1.6.3.2 The availability of utilities and access thereto."

"3.2.1.6.3.3 Conditions affecting transportation, disposal, handling and storage of materials, supplies and equipment."

"3.2.1.6.3.4 Any materials, supplies or equipment which are to be furnished by the Owner for the Contractor's use."

"3.2.1.6.3.5 The type and availability of tools, equipment and facilities to perform the Work."

"3.2.1.6.3.6 The availability and adequacy of labor and trades, and, if applicable, union wage scales, benefits, working conditions, craft jurisdictions, area practices and collective bargaining agreements affecting the Work."

"3.2.1.6.3.7 Prevailing weather and climatological conditions."

"3.2.1.6.3.8 All laws applicable to the Work and to the Contractor."

"3.2.1.6.3.9 All other factors which may affect the Contractor's performance of the Work."

B. Paragraph 3.4: Amend this Paragraph by adding Subparagraphs 3.4.4 through 3.4.7 as follows:

"3.4.4 The Contractor shall employ competently trained and experienced engineers and supervisors, who shall coordinate general, mechanical, and electrical Work and crafts with the required construction progress. The Contractor shall exercise complete control over their Subcontractor(s) in a manner which will unite their efforts toward completion of the project as contracted."

"3.4.5 The Contractor shall continuously maintain adequate protection of all their Work and the Work of Subcontractors from damage and shall hold harmless the Owner and Architect/Engineer from injury or loss arising in connection with this contract, including legal defense costs. The Contractor shall make good any such damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or those caused by agents or employees of the Owner."

"3.4.6 The Contractor shall be responsible for and shall establish and verify exterior lines and the required elevations of all buildings and structures to be erected at the site."

"3.4.7 The Contractor shall coordinate and expedite the Work of all lower tier Contractors."

C. Paragraph 3.5: Amend this Paragraph by adding Subparagraphs 3.5.1, 3.5.2, and 3.5.3 as follows:

"3.5.1 The Contractor shall warranty that all Work executed under the respective sections will be free from defects of materials and workmanship for the period of one (1) year from the Date of Substantial Completion of the Work or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. The Contractor further agrees that they will, at their own expense, repair and replace all such defective Work, and all other Work damaged that becomes defective during the term of the warranty. Where warranties are required, Contractor shall secure warranties in writing from Subcontractors, manufacturers and/or material suppliers addressed to and in favor of the Owner and deliver same to the Owner upon completion of Work. Delivery of warranties shall not relieve the Contractor from any obligations assumed under any other provisions of Contract."

"3.5.2 Any damage to the building or its contents and/or Work of other Contractors caused by failure of any piece of equipment and/or faulty installation shall be repaired or replaced by the party or parties furnishings the original equipment/installation and paid for by the Contractor at fault."

"3.5.3 An inspection of the installed Work and/or equipment will be made just before the end of the stipulated warranty period and any installations and/or equipment which, in the opinion of the Architect/Engineer and/or Owner, show undue wear, failure, incorrect operation, or otherwise do not conform to the letter and intent of the Contract Documents shall be repaired or replaced by the Contractor furnishing same at no additional charge."

D. Paragraph 3.6: Amend this Subparagraph by adding the words "Unless otherwise provided in the Contract Documents," to the beginning of this Paragraph.

E. Paragraph 3.9: Amend this Paragraph by adding Subparagraph 3.9.4 as follows:

"3.9.4 Subcontractors for any other Work shall have a competent superintendent at the site at all times when Work is being performed under their contracts.

F. Paragraph 3.13: Amend this Paragraph by adding Subparagraph 3.13.1 as follows:

"3.13.1 The Contractor shall prepare an overlay sketch of the construction areas indicating spaces assigned for field office, storage sheds, containers, trailers and field

shops, and for stockpiles and staging of materials for all trades. This sketch shall be submitted to the Owner and the Architect/Engineer for their information prior to moving any such equipment and materials onto the Project Site."

G. Paragraph 3.16: Amend this Paragraph 3.16 adding the following to the end:

"If Work is being executed at locations other than the Project site, the Contractor shall notify the Architect/Engineer where such Work is being executed, and at what time such Work will be ready for inspection, in order that the Architect/Engineer may inspect such Work Prior to its delivery to the Project Site."

H. Paragraph 3.18: Amend this Paragraph by adding Subparagraph 3.18.3 as follows:

"3.18.3 The Contractor shall indemnify the Owner and Architect/Engineer for any claim, demand or expense which may be made by reason of:

".1 Any injury to person or property sustained by the Owner or by any person, firms, or corporations, if caused by the Contractor."

".2 Any injury to person or property sustained by any person, firms, or corporations caused by an act or omission of the Contractor or of any person, firm, or corporation directly or indirectly employed by him in connection with this Work, whether the said injury or damage occurs upon or adjacent to the Work."

".3 The Contractor, at his own cost, expense, and risk, shall defend any and all actions, suits, or other legal proceedings that may be rendered against the Owner and Architect/Engineer in any such action, suit, or proceedings."

".4 The Contractor shall indemnify the Owner and Architect/Engineer from any and all costs resulting from any claim or suits in connection with liens that may be brought or instituted against the Owner. Neither the final payment or any part of the retained percentage of the Contract shall become due until the Contractor has delivered to the Owner a complete release of all liens arising out of the Contract."

2.04 ARTICLE 4

A. Subparagraph 4.1.2: Delete this Subparagraph in its entirety.

B. Subparagraph 4.2.7: Modify the first sentence of this Subparagraph by deleting the words "approve or take" and substituting the word "indicate."

C. Subparagraph 4.2.10: Amend this Subparagraph by adding the words "in writing" after the word "agree" in the first sentence.

2.05 ARTICLE 5

A. Paragraph 5.3: Amend this Paragraph by adding the following sentence thereto:

"Unless otherwise excepted, nothing contained in this Contract shall create any contractual relationship between any Subcontractor and the Owner."

2.06 ARTICLE 6 (NO CHANGE)

2.07 ARTICLE 7

A. Paragraph 7.1: Amend this Paragraph by adding the following new Subparagraph 7.1.4:

"7.1.4 When a change in the Work is contemplated which may affect the Contract Sum or duration of the Work, the Architect/Engineer will issue a 'Proposal Request' detailing the Work involved in such proposed change. Upon receipt of such 'Proposal Request,' the Contractor shall promptly, but in no case longer than five (5) working days, issue a reply or 'Change Quotation,' stipulating the change in cost of Project and/or duration as a result of the proposed change. This issuance of a Proposal Request does not, in any way, authorize commencement of the Work therein described. Should, after review and consultation with the Owner, the Architect/Engineer find the 'Change Quotation' by the

Contractor to be acceptable, the Architect/Engineer will within thirty (30) calendar days issue a written 'Change Order' to the Contractor."

B. Add the following Subparagraph 7.1.5 as follows

"7.1.5 If Contractor proceeds with change order work before receiving a fully executed change order or change directive, then Contractor waives the right to object to the scope of work change, the amount of the change order, and the adjustment, if any, to the time of performance."

C. Amend Subparagraph 7.3.3 by adding the following Subparagraphs:

".5 Time and material."

".6 Extra Work performed under Item .5 above shall be upon the option of the Owner only in the event that the lump sum required under Item .1 is not acceptable."

".7 Extra Work shall be performed for the cost of the labor payroll plus 15% of the labor payroll and the cost of the material plus 5% of the material cost. Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work. Labor payroll is defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.

.8 In case such Work is performed by a Subcontractor or a lower tier Contractor with the Owner's consent, the Work shall be marked up as indicated in 7.3.3.7 by the Contractor actually performing the Work. Each succeeding Contractor may mark up their direct labor and material costs as indicated in 7.3.3.7. Otherwise each succeeding Contractor, including the Prime Contractor, may add 5% for handling/coordination. Additional mark-ups of a Subcontractor's costs shall not be permitted.

".9 Costs for bond premiums are allowable provided documentation from the Bonding Company is included detailing the added bond cost premium, the current bond total and the new bond total."

D. Subparagraph 7.3.7: Amend the following:

.1 Delete the text and replace with:

".1 The cost of the labor payroll plus 15% of the labor payroll;"

.2 Delete the semicolon at the end of the sentence and add "plus 5% of the total of the costs;"

.3 Delete the semicolon at the end of the sentence and add "plus 5% of the total of the costs;"

.4 Delete all text following the word bonds in the first line and replace with ",with documentation from the Bonding Company including details of the added bond cost premium, the current bond total and the new bond total;"

.5 Delete the text and replace with:

".5 Additional costs of supervision directly attributable to the change if the change results in supervision of change work at a time outside the normal work hours of the Project."

E. Paragraph 7.3: Add the following new Subparagraphs 7.3.11, 7.3.12, and 7.3.13:

"7.3.11 When extra Work is performed under Item 7.3.3.2 above, said unit prices shall represent the total cost to the Owner and shall not be subject to any additional charges whatsoever."

"7.3.12 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete breakdown of costs, including labor, material, and subcontracts. Labor and material shall be marked up in the manner prescribed herein. Where cost items consist of major subcontracts, such contracts shall be broken down in a similar fashion."

"7.3.13 When changes are made that result in a credit to the Owner, the value of the credit will be established by the method indicated in Items 7.3.3.1 or 7.3.3.2"

2.08 ARTICLE 8 (NO CHANGE)

2.09 ARTICLE 9

A. Subparagraph 9.3.1: Amend this Subparagraph by deleting the words "if required" in the third line.

B. Paragraph 9.3: Amend this Paragraph by adding Subparagraph 9.3.4 as follows:

"9.3.4 The Owner will retain, until the Work is at least fifty percent (50%) complete, ten percent (10%) of the amount due the Contractor on account of approved progress payments. At the time the Work is at least fifty percent (50%) completed or thereafter, if the manner of completion of the Work and its progress are and remain satisfactory to the Owner and Architect/Engineer, and in the absence of other good and sufficient reasons, the Architect/Engineer will (upon presentation by the Contractor of Consent of Surety) recommend to the Owner that any remaining approved partial payments be paid in full. Regardless of the Owner's decision relative to further retainage, all prior retainages that were withheld will be held until completion of the contract Work and all remedial Work, listed as conditions of substantial completion, and following final payment. If retainage is limited to ten percent (10%) of the first fifty percent (50%) of the contract amount, as described above, five percent (5%) will be withheld from payments for all subsequent change orders; therefore, the minimum retainage shall be five percent (5%) of the current contract amount."

C. Subparagraph 9.6.3: Delete this Subparagraph in its entirety.

D. Subparagraph 9.6.5: Delete this Subparagraph in its entirety.

E. Paragraph 9.7: Delete the text of this Paragraph and replace with the following new Subparagraphs 9.7.1 and 9.7.2

"9.7.1 The Architect shall issue to the Owner a Certificate for Payment within seven calendar days after receipt of the Contractor's Application for Payment. Upon receipt of the Certificate for Payment (Application for Payment) from the Architect, the Owner will endeavor to make payment to the Contractor within fifteen calendar days. If payment is not made within a reasonable time, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents."

"9.7.2 If an Application for Payment is being held for just cause, the Architect shall notify the Contractor in writing of the cause and what remedial action must be taken for the Application for Payment to be released for payment.

F. Subparagraph 9.10.2: Amend this Subparagraph by deleting the word "and" in the eighth line and adding the following after the "Owner" in the eleventh line:

"and (6) the Architect/Engineer has received the required Record Drawings, brochures, manuals, operating instructions, warranties, affidavits, final application for payment, any other special data requirements and has performed a final inspection and confirmed that all items of completion are correct and acceptable at which time he will initiate a 'Final Completion' letter establishing the date of Final Completion."

2.10 ARTICLE 10

A. Subparagraph 10.2.2: Amend this Subparagraph by adding the following to the end thereof:

"In the event of conflict between these Contract Documents and any Federal, State, or Local Authority laws, rules, regulations, or requirements, the most stringent requirement shall govern the Work."

B. Subparagraph 10.3.1: Amend this Subparagraph by deleting the phrase "and Architect" in the sixth line.

C. Subparagraph 10.3.2: Amend this Subparagraph by deleting the phrase "and Architect" in the second sentence; deleting the phrase "and the Architect" from the third sentence; and by deleting the words "either" and "or Architect" from the fourth sentence; by replacing the phrase, "and the Architect have" with the word "has" in the fourth sentence.

D. Paragraph 10.3 add the following Subparagraph 10.3.7

10.3.7 "The Contractor shall also comply with all the safety paragraphs listed in Section 00 30 00 of the Contract Documents. In the event of conflict between 10.3 and Section 00 30 00, Section 00 30 00 shall prevail."

2.11 ARTICLE 11

A. Article 11: Insert a new Subparagraph 11.1 and renumber each succeeding Paragraph accordingly:

11.1 See Specification Section 00 20 20 for additional requirements. In the event of conflict between Section 00 20 20 and this Paragraph 11, requirements of Section 00 20 20 shall prevail.

B. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding the phrase, "and that are acceptable to the Owner," following the word "located," in the second line.

C. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding the phrase, ", Indiana State University, the Indiana State University Board of Trustees and the Architect/Engineer," following the word "Contractor," in the second line.

D. Subparagraph 11.1.1 (renumbered 11.2.1): Amend this Subparagraph by adding Sub-Subparagraphs .9 and .10 as follows:

".9 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

Premises Operations (including X, C, and U coverage's as applicable)

Independent Contractor's Protective

Products and Completed Operations

Personal Injury Liability with Employment Exclusion deleted

Contractual, including specified provision for the Contractor's obligations under Paragraph 3.18

Owned, non-owned and hired motor vehicles"

".10 Broad Form Property Damage including Completed Operations: If the General Liability coverage's are provided by a Commercial General Liability Policy on a claims made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage's required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2."

E. Subparagraph 11.1.2 (renumbered 11.2.2): Add the following renumbered Subparagraph 11.2.2.1

"11.2.2.1 The insurance required by renumbered Subparagraph 11.2.1 shall be written for not less than the following limits, or greater if required by law:

See Section 00 20 20 for Insurance Requirement Levels

F. Subparagraph 11.1.3 (renumbered 11.2.3): Amend this Subparagraph by changing the word "30" to "60" in the second sentence.

G. Subparagraph 11.1.3 (renumbered 11.2.3): Amend this Subparagraph by deleting the last sentence beginning with the phrase, "Information concerning reduction…." And substituting the following:

"The form of the certificate shall be AIA Document G715, SUPPLEMENTAL ATTACHMENT for Acord Certificate of Insurance 25-S (7/90). Contractor shall furnish promptly to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Certificates of Insurance shall name the Owner (Indiana State University Board of Trustees) and Architect/Engineer as 'Additional Insured's."

H. Paragraph 11.1(renumbered 11.2): Amend this Paragraph by adding Subparagraph 11.2.5 as follows:

"11.2.5 The Contractor, in connection with the above mentioned Workmen's Compensation and Occupational Disease Insurance, shall furnish to the Owner, prior to commencement of the Work, duly executed and validated forms as prescribed by the Indiana Industrial Board showing that such insurance is in full force and effect."

I. Sub-subparagraph 11.3.1.1 (renumbered 11.4.1.1): Amend this Subparagraph by adding the following Subparagraph 11.4.1.1.1:

"11.4.1.1.1: Such Insurance shall not insure against loss due to theft of Contractor's, Subcontractor's, Sub-Subcontractor's tools, equipment, and other personal property. The responsibility to guard against such thefts shall lie with the respective Contractor, Subcontractor, or Sub-Subcontractor whose tools, equipment, and other personal property are susceptible to such thefts."

J. Subparagraph 11.3.1.3 (renumbered 11.4.1.3): Add the following phrase to the end of the sentence:

The deductible amount shall be $25,000.00 unless otherwise advised by the Owner.

K. Subparagraph 11.3.9 (renumbered 11.4.9): Delete this Subparagraph in its entirety.

2.12 ARTICLE 12

A. Subparagraph 12.2.2.1: Amend this Subparagraph by adding the following sentence to the end:

"Where special warranties of longer duration are required, the Contractor shall secure warranties from Subcontractors, manufacturers and/or material suppliers as applicable, addressed to and in favor of the Owner, and deliver copies of same to the Owner upon completion of the Work. Delivery of said warranties shall not relieve Contractor of any obligation assumed under any other provisions of the Contract."

2.13 ARTICLE 13

A. Subparagraph 13.1: Delete the text in its entirety and replace with the following:

"13.1 Contractor and all Subcontractors are responsible to comply with Indiana Code as it pertains to public works projects. The following are notable requirements set forth in IC 5-16-13, in effect as of July 1, 2015, but are not inclusive of all requirements."

B. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.1:

"13.1.1 Contractor agrees, and represents to Owner, that at least 15% of the Contract Price (at the time this Agreement is executed) is comprised of any combination of the

following: 1) Work performed by Contractor's employees; 2) Services supplied directly by Contractor's employees; or 3) Materials supplied directly by Contractor.

C. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.2:

"13.1.2 Contractor and all Subcontractors, regardless of tier, shall not pay cash to its employees for Work performed on this public works Project."

D. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.3:

"13.1.3 Contractor and all Subcontractors, regardless of tier, shall comply with federal Fair Labor Standards Act of 1938."

E. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.4:

"13.1.4 Contractor and all Subcontractors, regardless of tier, shall be in compliance with workers compensation requirements of Indiana Code 22-3-5-1 and Indiana Code 22-3-7-34 and commits worker's compensation fraud if such Contractor or Subcontractor falsely classifies an employee as an independent contractor, sole proprietor, owner, partner, officer, or member of a limited liability company."

F. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.5:

"13.1.5 Contractor and all Subcontractor, regardless of tier, shall be in compliance with unemployment compensation system requirements of Indiana Code 22-4-1 through 22-4-39-5."

G. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.6:

"13.1.6 Contractor and all Subcontractors, regardless of tier, shall be in compliance with requirements for drug testing of its employees set forth in Indiana Code 4-13-18-1 through 4-13-18-7 if estimated cost of public works Contract is at least $150,000. With each application for payment the Contractor shall submit an affidavit, dated and signed by the Contractor, that neither they nor, to their knowledge, any of their subcontractors has violated the "Drug Testing Program provision of the Indiana Code."

H. Subparagraph 13.1: Add the following numbered Subparagraph 13.1.7:

"13.1.7 Following provisions shall be in effect for Contracts awarded after March 31, 2018."

I. Subparagraph 13.1.7: Add the following numbered Subparagraph 13.1.7.1:

"13.1.7.1 Contractor and Subcontractors, regardless of tier, shall preserve its payroll and related records for three (3) years after completion of the project work and such records shall be open to inspection by the Indiana Department of Workforce Development."

J. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.2 and 13.1.7.2.1:

"13.1.7.2 Recommended Employment of Apprentices"

"13.1.7.2.1 Owner strongly recommends that Contractor employs apprentices from each building trades craft involved in the Project to the maximum extent feasible. In doing so, the Contractor shall consider whether such apprentices are indentured into a Joint Apprenticeship Training Program or other comparable bona fide apprenticeship training program, registered and certified with the U.S. Department of Labor, Bureau of Apprenticeship and Training and shall use as a guide the Apprenticeship Standards of the Labor-Management Contract for the appropriate jurisdictional area when determining the appropriate ratio of apprentices from each respective craft."

K. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.3, 13.1.7.3.1 and 13.1.7.3.2:

"13.1.7.3 Contractor's Certification of Authorized Employment (E-Verify Requirements.)"

"13.1.7.3.1 In accordance with Indiana Code 22-5-1. 7 as amended, each Contractor in any tier of a public works project shall not knowingly employ unauthorized aliens. Every contractor shall enroll in and verify the work eligibility status of all employees hired after June 30, 2015 using the U.S. Citizenship and Immigration Services (USCIS) E-Verify program as defined in IC §22-5-1.7-3, unless the E-Verify program no longer exists.

"13.1.7.3.2 The Prime Contractor shall require their subcontractors who perform work under this Contract to certify to the Prime Contractor that the subcontractor does not knowingly employ or contract with an unauthorized alien and that the subcontractor has enrolled and is participating in the E-Verify program. The Prime Contractor agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor. The Prime Contractor and its sub-contractors at all levels must comply with all provisions of the statute or the Contract is subject to cancellation.**"**

L. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.4 and 13.1.7.4.1

"13.1.7.4 Non-Collusion Affidavit"

"13.1.7.4.1 The Bidder, by its officers and agents or representatives present at the time of filing their bid, being duly sworn, say on their oaths that neither they nor any of them have in any way, directly or indirectly, entered into any arrangement or agreement with any other bidder, or with any public office of the State of Indiana, of any county or municipality or other public offices whereby such affiance or either of them, has paid or is to pay to such other bidder or public officer any sum of money, or has given or is to vie to such other bidders or public officer anything of value whatever, or such affiance of affiance or either of them has not, directly or indirectly entered into any arrangement or agreement with any other bidder or bidders, which tends to or does lessen or destroy free competition in letting of the contract sought for by the attached bids; that no inducement of any form or character other than which appears upon the face of the bid will be suggested, offered, paid, or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the contract, nor has this bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the contract sought by this bid."

M. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.5 and13.1.7.5.1

"13.1.7.5 Non-Discrimination"

"13.1.7.5.1 The Bidder and its Subcontractors, if any, shall not discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans with Disabilities Act. Breach of this covenant may be regarded as a material breach of the Contract."

N. Subparagraph 13.1.7: Add the following numbered Subparagraphs 13.1.7.6 and13.1.7.6.1

"13.1.7.6 Certification of United States Steel"

"13.1.7.6.1 The Bidder certifies that the Bidder and all Subcontractors will comply with the statutory obligations to use steel products made in the United States.

O. Subparagraph 13.5.1: Add the following Subparagraph 13.5.1.1:

"13.5.1.1: Prior to commencing the Project the Contractor shall submit a list of all proposed testing companies for the Project to the Architect/Engineer and Owner for approval."

P. Subparagraph 13.5.2: Add the following Subparagraph 13.5.2.1

"13.5.2.1: Prior to testing, unless the testing company has been previously approved, the Contractor shall submit to the Architect/Engineer and Owner the proposed testing company for approval."

2.14 ARTICLE 14

A. Subparagraph 14.1.1: Amend this Subparagraph by deleting Sub-Subparagraph .4.

B. Subparagraph 14.2.1: Amend this Subparagraph by adding a new Sub-Subparagraph 14.2.1.5 as follows:

"5 becomes financially incapable of completing the Work contemplated by the Contract Documents."

C. Add subparagraph 14.2.5 as follows

"14.2.5 Contractor shall be responsible to reimburse Owner all attorney's fees and expenses incurred by Owner if Contractor is terminated for cause."

2.15 ARTICLE 15

A. Subparagraph 15.1.2: Delete the text of this Subparagraph and replace by adding the following Subparagraph 15.1.2.1, Subparagraph 15.1.2.2 and Subparagraph 15.1.2.3:

"Subparagraph 15.1.2.1 Claims must be initiated by written notice to the Architect within 21 calendar days after the occurrence of the event."

"Subparagraph 15.1.2.2 Notice of a claim must include what the claim is for, when the event occurred causing the claim, the amount of additional time (Project extension) being requested and any financial implications of the claim with sufficient specificity to allow the Owner an opportunity to modify the Project scope to remain within the Owner's approved budget."

"Subparagraph 15.1.2.3 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction."

B. Subparagraph 15.1.4 delete this Subparagraph in its entirety.

C. Subparagraph 15.1.5 delete this and all its subparagraphs in their entirety.

D. Subparagraph 15.3.2 Delete the text in its entirety and replace with the following:

"15.3.2. If, through acts of neglect on the part of the Contractor, any other Contractor or Subcontractor shall suffer loss or damage on the Work, the Contractor shall agree to settle with such other Contractor or Subcontractor by negotiation or binding dispute resolution, if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim, including legal defense costs."

E. Subparagraph 15.3.3 In the first sentence after the word "fee" add a period and delete the remainder of that sentence.

F. Paragraph 15.4: Delete this Paragraph in its entirety. Additionally; delete all references and requirements for Arbitration throughout the entire AIA A201-2007 Document and replace with Litigation.

PART 3 – NOT USED

END OF SECTION 00 20 11

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Preface: ***These Supplementary General Conditions supplement and modify AIA Document A201 General Conditions of the Contract for Construction (2007 Edition), General Conditions between the Owner and Contractor.***

PART 1- SUPPLEMENTARY GENERAL CONDITIONS

1.01 DEFINITIONS

A. "Contract". The Contract or Agreement, the Notice to Bidders, the Instructions to Bidders, the Bid or Proposal, the General Conditions, The Special Conditions, the Specification and Drawings, also any Addenda or the Modifications incorporated in any of the above documents before the execution of the Contract or Agreement.

B. "Owner": The Indiana State University Board of Trustees.

C. “Architect/Engineer”: the individual or firm hired by the Owner to prepare the Construction Documents and to Administer the Contract.

D. "Contractor": The person, firm or corporation who, with the Owner, executes the Contract, or the duly recognized assignee thereof.

E. "Subcontractor": A person, firm or corporation who, under contract with Contractor, furnished material only, labor and materials, or labor only, at the site of or for the project.

F. “Director": The Director of Department of Facilities Management at Indiana State University, or his duly authorized representative.

G. "Surety": Any person, firm or corporation which has executed, as surety, the Contractor's performance bond securing the performance of the within contracts.

H. "Work": Includes both materials and labor.

1.02 BOND

A. Before any contract made for this work becomes valid, the Contractor shall furnish the Owner a satisfactory performance and payment bonds, in such form as the Owner may prescribe and with such surety or sureties as it may approve each in an amount equal to 100% of the total contract price. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. These bonds shall guarantee all labor and material to be as required, the faithful payment of any claim or liens from any cause for which the Contractor or any Subcontractor is liable, including those for labor, materials, utility service, transportation costs and for supplies, equipment, machinery (or the rental thereof).

B. Licensed Sureties and Insurers

1. All bonds required by the Contract Documents (such as the Bid Specifications, Award Letter, Contract for Construction, etc.) to be purchased and maintained by the Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. In addition to appearing on Circular 570 U.S. Dept. of the Treasury, such Surety or insurance company shall maintain an A.M. Best's Rating of not less than "A".

C. The surety bond shall contain the following paragraph:

1. "The said surety for value received hereby stipulates and agrees that no change, extension of time, alterations, or additions to the terms of the contract, or to the work to be performed hereunder, or the specifications accompanying them, shall in any way affect its obligations on this bond, alteration or addition to the terms of the contract, or to the work or the specifications."

1.03 INSURANCE

NOTE: The dollar amounts shown in this paragraph are for jobs over $50,000. See footnotes and amounts for jobs less than $50,000.

A. The Prime Contractor(s) shall provide all insurances listed here-in in these Specifications and shall require the Subcontractor(s) to provide the same. The Prime Contractor(s) shall not commence work under this Contract until they have obtained all insurance required by these specifications and until such insurance has been approved by the Owner, nor shall the Contractor allow any Subcontractor to commence work on his subcontract until all similar insurance required of the Subcontractor has been obtained. Policies expiring on a fixed date before final acceptance of the project must be renewed and evidence of such renewal submitted to the Owner before such date.

B. The Prime Contractor(s) shall furnish the Owner with satisfactory evidence of the insurance required, with satisfactory compliance as determined solely by Owner.

C. It is solely the responsibility of the Prime Contractor(s) to confirm that the Subcontractor(s) are in compliance with the insurance requirements of these Specifications, to maintain copies of the Subcontractors insurance on file and to be prepared to provide evidence of these insurances to the Owner upon demand.

D. Insurance Required:

1. Worker's Compensation and Employers Insurance:
   a. The Prime Contractor(s) shall maintain during the life of this contract Worker's Compensation and Employers Liability Insurance for all Prime Contractor's employees employed at or involved in any manner with the project, and, in case any work is sublet, the Prime Contractor(s) shall require the Subcontractor(s), at their own expense, similarly to provide Worker's Compensation and Employers Liability Insurance for all of the Subcontractor's employees engaged in or involved in any manner with work under this contract. Such Workers' Compensation insurance will be in accordance with the statutory requirements of the State of Indiana, with and including Worker's Compensation for All Other States, if any. The Prime Contractor(s) shall and require Subcontractor(s) to provide insurance coverage equal to that provided under the Worker's Compensation Act, for the protection of the Contractor's employees not otherwise protected. Employer's liability coverage must be maintained in amounts not less than $500,000/$500,000/$500,000. Limits may be provided through a single policy or a primary/excess policy basis.

2. Commercial General Liability Insurance.[1]
   a. The Contractor shall and require Subcontractors, at their own expense respectively, to maintain during the life of this contract Commercial General Liability Insurance insuring the Prime Contractor and any subcontractor, and owner and any other party required to be insured, from claims for bodily injury, death, personal injury and property damage which may arise from or on account of operations under this Contract, whether such operations be by the Prime Contractor(s) or by any

[1] For Smaller Contracts, the following limits (including umbrella liability) are permitted:
Contracts $25,000 to $49,999..... $ 2,000,000
" $10,000 to $24,999..... $ 1,000,000
" $ 9,999 and under..... $ 500,000

Subcontractor or by anyone directly or indirectly employed by either of them and the amounts of such insurance shall be as follows:

- $2,000,000 General Aggregate
- $1,000,000 Combined Single Limit Bodily Injury, Property Damage
- $1,000,000 Products/Completed Operations
- $1,000,000 Personal Injury and Advertising Injury
- $ 100,000 Fire Damage

The General Aggregate limit shall apply separately, in total, to this project only.

3. Business Auto Insurance[2]:
   a. The Prime Contractor(s) shall and shall require all Subcontractors to maintain at their own expense respectively, at all times during the life of this contract, business auto insurance covering all liability and claims arising from the ownership, use, maintenance, operation, loading or unloading of automobiles anywhere in the United States, in connection with the performance of the Contract, whether such automobiles are owned, hired, or non-owned by the Contractor or Subcontractors.
   b. Such auto insurance shall be written with a limit of not less than $1,000,000 per occurrence as a combined single limit for Bodily Injury and Property Damage coverage.
4. Umbrella Liability Insurance[2]:
   a. The Prime Contractor(s) shall and shall require all Subcontractors to maintain at their own expense respectively, at all times during the life of this Contract, Umbrella Liability Insurance providing excess coverage over the above specified primary insurance in an amount not less than:
      - $1,000,000 for contracts $50,000 to $99,999.99
      - $2,000,000 for contracts $100,000 to $999,999.99
      - $3,000,000 for contracts $ 1,000,000 to $2,999,999.99
      - $5,000,000 for contracts over $3,000,000

E. Additional Insurance Requirements:

1. The Prime Contractor(s) shall and shall require all Subcontractors to include Indiana State University, Indiana State University Board of Trustees and any Architect/Engineer Firm hired by Indiana State University for the Project, as an additional insured on their Commercial General Liability, Umbrella Liability Insurance and Business Auto Insurance policies with regard to this contract.
2. Certificate(s) of Insurance shall include an endorsement of a Waiver of Subrogation in favor of the Owner for Commercial General Liability Insurance, Umbrella Liability Insurance, Worker's Compensation and Employers Liability Insurance and Business Auto Insurance.
3. On Projects in excess of $1,000,000.00 a copy of the applicable pages from the Contractor's policy shall be provided showing the endorsements listed in paragraphs 1 and 2 of this Item 1.03 E.
4. With regard to the above mentioned Commercial General Liability, Business Auto, and Umbrella Liability Insurance, if in the event of any major change or cancellation of such policy, the Prime Contractor(s) shall and shall require all Subcontractors to give a 30-day advance notice to the Owner.
5. The Prime Contractor(s) shall and shall require of all Subcontractors that the insurance companies must have an A.M. Best's rating of not less than an "A" for projects over $150,000 and a rating of B+ or higher for projects under $150,000 and that the insurance

[2] For Smaller Contracts, the following limits (including umbrella liability) are permitted

Contracts $25,000 to $49,999.....$2,000,000
$10,000 to $24,999.....$1,000,000
$ 9,999 and under.....$ 500,000

companies are duly licensed or authorized in the jurisdiction in which the Project is located to issue insurance policies for the limits and coverages so required.

F. Builders Risk Insurance:

1. The Owner agrees to provide property insurance including Builders Risk insurance for property under construction, and all materials and labor at or within 1,000 feet of the site intended for use in the "work" or project. Pursuant to this agreement, Owner hereby affirms the policy contains a waiver of subrogation in favor of the contractor or subcontractors should loss or damage of the type insured against result in loss to covered property; and Owner agrees to release from liability the contractor, to the extent such loss or damage is insured by said policy.
2. Coverage does not extend to personal property, tools, equipment, scaffolding, staging, or similar equipment of the contract or subcontractor(s), or any employees thereof.
3. Notwithstanding the foregoing however, Contractor is responsible for the property insurance deductible of $25,000 applicable to each covered loss to the work or project. Contractor acknowledges and affirms it will, without delay, pay the deductible, or if the loss remains within the deductible, pay that part of the deductible that equals the loss amount.

G. Indemnification:

1. The Prime Contractor shall and shall require Subcontractors to indemnify the Owner and any other party required to be insured from all claims arising from the failure of the Prime Contractor(s) to require the Subcontractors to provide the insurance required by these Specifications.
2. Notwithstanding any other provision to the contrary, the Contractor(s) agree to indemnify the Owner only for losses due to personal injury, or property damage to the extent caused by Contractor's negligent acts or omissions, or the negligent acts or omissions of Contractor's employees, agents and subcontractors during the performance of this Contract, but not to the extent caused by others. The Contractor shall defend Owner on claims that do not present a conflict of legal theory or fact between Owner and Contractor. Each party shall defend itself on any claim that does present a conflict of legal theory or fact between the parties.
3. Under no circumstances shall either party be liable for any loss, damage or delay due to any cause beyond either party's reasonable control, including but not limited to acts of government, fire, explosion, theft, weather damage, flood, earthquake, riot, civil commotion, war, mischief or act of God.
4. In the event of a strike or work stoppage by Contractor's employees, the Contractor agrees to use its best efforts to fulfill its obligations pursuant to their contract utilizing management and supervisory personnel.
5. Under no circumstances shall either party be liable to the other for special, indirect, or consequential damages of any kind including, but not limited to, loss of profits, loss of good will, loss of business opportunity, additional financing costs or loss of use of any equipment or property, whether in contract, tort (including negligence), warranty or otherwise, notwithstanding any indemnity or other provision to the contrary.

1.04 SUBCONTRACTORS

A. At the time of Bid the Prime Contractor(s) (Bidder(s)) shall provide the names of the proposed Subcontractors listed in Appendix A of the Bid Form. Prior to the Awarding of the Contract, the Contractor shall submit to the Owner, in writing, the names of all the proposed Subcontractors and major material vendors. All Subcontractors shall be licensed and bonded and shall be held to the same level of experience and qualifications as are required of the Prime Contractor (Bidder) in Section 001000 NOTICE TO BIDDERS last paragraph.

B. The Prime Contractor shall be responsible for the acts and omissions of his Subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

C. Nothing contained in the Contract shall create any contractual relationship between any Subcontractor and the Owner, and no Subcontractor will be recognized as a party to the Contract.

D. The Prime Contractor shall use the Subcontractors, Suppliers, Materials and Equipment as listed in the Bid Form Appendix “A” submitted at the time of Bid. There shall be no changes permitted to this list except as listed in Section 00 10 10 Paragraph 3.14 APPENDIX A, Item B.1.

1.05 DRAWINGS

A. The drawings referred to in these specifications show such plans and details as are regarded necessary by the Architect/Engineer and/or the Owner to properly illustrate the work required, to estimate the cost of the work, and to complete its construction.

B. The Architect/Engineer and/or the Owner will from time to time furnish such additional detail and working drawings as may be deemed necessary to interpret and explain the Contract drawings and all such additional drawings shall be of equal force with those mentioned above and shall be considered as forming part of this Contract.

C. The general character of the work shall be subject to minor modifications when detailed or full sized drawings for such work are prepared.

D. All lettering on drawings is to be considered a part of the drawings.

E. All drawings, specifications, etc., are the property of the Owner and shall be returned before the final award is issued, if so requested.

1.06 RELATIONSHIP AND PRIORITY OF DOCUMENTS

A. The documents comprising the Contract are complementary and what is called for by one shall be as binding as if called for by all. The intention of the Contract is to include all labor, materials, and equipment necessary for the proper execution of the work.

B. In the case of a discrepancy between the requirements of the Drawings and the Specifications or between Sections of the Specifications:

1. The more stringent shall apply.
2. In equal situations the Specifications or as directed by the Owner prevails.

1.07 PERMITS

A. The Contractor shall give all requisite notices to public officials, secure and pay for all permits, legal fees or charges, have the work inspected by all proper public authorities, pay all charges connected with such inspections and deliver the proper inspection certificates and all receipts for charges to the Owner.

B. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and orders of any public authority bearing on the performance of the work. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Owner in writing, and any necessary change shall be accomplished by the appropriate modification. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations and without such notice to the Architect, he shall assume full responsibility therefore and shall bear all cost attributable thereto.

1.08 SAMPLES

A. The Contractor shall submit in writing to the Owner for approval samples and shop or installation drawings of the materials he proposes to use, or such other related materials as owner otherwise requests.

B. Each sample shall be labeled, bearing the name and quality of the material, the Contractor's name, the date and a description of the sample. A letter from the Contractor stating that the samples conform to the requirements of the drawings and specifications shall accompany all such samples. Transportation charges on all samples shall be prepaid.

C. Samples and drawings shall be submitted in due time so as to permit proper consideration without delaying the Contractor's operation. Material shall not be ordered until approval is received from the Owner, in writing. The use of any material will be permitted only so long as it remains equal to the approved sample.

1.09 CONTRACTOR'S SUPERVISION

A. The Prime Contractor shall maintain on the Project site a competent Project Superintendent at all times any work is being performed; either by the Prime Contractor's workers or any Subcontractor's workers**. If the Project Superintendent is not on the Project site the Owner shall be notified immediately. If the Project Superintendent is not on the jobsite, without written prior approval or notification to be away from the jobsite, the Owner may be entitled to a $1,000 credit for each day or part of the day the Project Superintendent is not onsite while actual work is being performed.**

B. The Contractor's superintendent shall represent the Contractor during their absence and all directions given the superintendent shall be as binding as if given to the Contractor.

1.11 LAYING OUT AND UTILITY LOCATES

A. The Contractor shall thoroughly examine the drawings and specifications before commencing work and report to the Owner if any discrepancy, errors, or defect appears, but he shall not be held responsible for their existence.

B. The Contractor shall lay out his own work.

C. Prior to any cutting, drilling, trenching, excavating or other earthwork the Contractor shall determine the exact location of all utility lines and appurtenances that could be encountered which are not shown on the drawings as follows.

1. A minimum of forty eight (48) hours prior to commencing work the Contractor shall contact Indiana Locates for all public utility locates.
2. A minimum of forty eight (48) hours prior to commencing work the Contractor shall contact the Project Coordinator for all ISU Utility locates.

D. Failure to contact for the appropriate locates shall make Contractor solely responsible for all costs incurred to repair all damaged utility lines or appurtenances.

E. The Contractor shall hand excavate within three (3) feet, or as required by the Utility Company, on either side of a marked utility unless exact depth of the marked utility is known and the planned work will in no way be in close proximity with the utility line or appurtenance.

1.12 MATERIAL AND LABOR

A. Except as otherwise stipulated, the Contractor shall provide and pay for all materials, labor, tools and equipment necessary for the execution of the work.

B. The Owner reserves the right to require the Contractor to discontinue the service of any workmen employed on the work whom he deems incompetent, negligent, or otherwise objectionable, and to suspend any portion of the work embraced in the Contract whenever, in his opinion, it would be inexpedient to start or continue such work.

1.13 DEFECTIVE WORK AND MATERIALS

A. Any materials and workmanship found to be defective, improperly placed, not in strict conformity with the drawings and specifications, or defaced or injured through action of fire or elements, through usage by the Contractor or his employees or from any other cause, shall be removed immediately from the premises and satisfactory materials or work substituted therefore without delay. This shall include making good the work of other Contractors destroyed or damaged by such removal or replacement. The cost of the above replacements shall be borne by the Contractor responsible for the defective work or material.

B. Should the Contractor in the execution of his work discover any imperfections or errors in the work of other Contractors that would interfere with the proper execution of his contract, he

shall immediately report this fact to the Owner. Errors or imperfections in the work of other Contractors will in no case excuse installation of imperfect work by this Contractor.

C. No previous inspection shall be held as an acceptance of defective work or materials or relieve the Contractor from the obligation to furnish sound materials or to perform satisfactory work in accordance with the contract requirements. The final payment shall not relieve the Contractor of the responsibility for faulty materials or workmanship and he shall remedy all such defects, settlements, or other work resulting there from, which shall appear within a period of one (1) year from date of final acceptance or within the period stipulated in certain separate guarantees or bonds required elsewhere in the specifications, whichever may be the longer.

D. The Owner shall be the sole judge of the materials furnished and the character of work performed.

1.14 RESPONSIBILITY FOR DAMAGE

A. The Contractor shall be responsible for all damages to life and property due to his action or failure to act when action would reasonably be expected. He shall be responsible for all parts of his work, both temporary and permanent, until the work under his contract is declared accepted by the Owner.

B. The Contractor shall continuously maintain adequate protection of all his work from damage, and shall protect the Owner's property and all adjacent property from injury in connection with the Contract.

C. The Contractor shall be held responsible for damage to work of other Contractors that is the result of his operation.

D. Should the Contractor believe that the work shown by the drawings or specifications is not correct when executed to obtain safe and substantial results, or if any discrepancy appears, it is his duty to immediately notify the Owner in writing, stop work on same, and await written instruction.

1.15 INDIANA SALES TAX

A. Indiana State University is a Tax Exempt Institution and Indiana Sales Tax for products permanently incorporated in work shall not be included as part of the Bid or on any Application for Payment.

B. Contractor Responsibilities:

1. Pay Indiana Sales Tax on all non-exempt purchases and provide the Owner with detailed documentation of all taxes of non-exempt items invoiced on their Application for Payment. Documentation shall be provided with their Application for Payment at the time of first billing of each taxable item.
2. Upon completion of work, file with Owner notarized statement that all purchases were made under their exemption certificate where entitled to be exempt.
3. Pay legally assessed penalties for improper use of the exemption certificate number.

1.16 CLEANING UP

A. The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish.

B. When directed by the Owner, the Contractor shall clear out and remove any rubbish that may constitute an obstruction to the progress of the work.

C. At completion of the contract, the Contractor shall remove from the premises all rubbish and surplus material, and shall repair any damage to his work no matter by who caused, and shall leave the premises clean and in perfect repair and order.

1.17 NON-DISCRIMINATION CLAUSE

A. "Pursuant to the requirements of Indiana Code 22-9-1-10 and 5-16-6-1, Contractor and his Subcontractors may not discriminate against any employee or applicant for employment to be employed in the performance of such contract, with respect to their hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment because of their sex, race, natural origin, ancestry or religion or disability as prohibited under the Americans With Disabilities Act. The contractor and subcontractor, if any, agrees to comply with all the provisions contained in the Equal Opportunity Clause quoted in Executive Orders No. 11246 and No. 11375. In addition, the contractor shall cause this Equal Opportunity Clause to be included in the subcontracts or purchase orders hereunder unless exempted by rules, regulations and orders of the Secretary of Labor issued pursuant to Section 204 of the Executive Orders No. 11246 and No. 11375 as amended. Breach of the covenant may be regarded as a material breach of contract."

1.18 PUBLIC RELATIONS

A. Indiana State University is an Affirmative Action Institution. Any inappropriate actions toward any Indiana State University student, faculty or staff member by any Contractor's Employee shall result in the employee being told to leave the Campus of Indiana State University immediately. This employee shall not be allowed to return to work on the Project for the duration of the Project or longer. Repeated offences by a Contractor's employees may result in disqualification of the Contractor for this and future Indiana State University Projects.

1.19 "OR APPROVED EQUAL" CLAUSE

A. Unless the Specifications indicates that substitutions are not allowed, whenever a material or article required is specified or shown on the plans by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory providing the material or article so proposed is of equal substance and function in the Architect/Engineer and Owner's opinion. It shall not be purchased or installed without written approval. Requests for substitution prior to Bidding shall be as per Section 001010 INSTRUCTIONS TO BIDDERS Item 1.08

B. Complete descriptive information, specifications and samples or sample material must be submitted at the time the proposal is submitted. In addition, a list of projects with dates and contact persons must be submitted at the time the proposal is submitted showing where the proposed alternate material or article has been installed or used. Failure to submit information as requested will be cause for rejection of the Bid submitted.

1.20 VERIFYING MEASUREMENTS

A. The Contractor shall verify all measurements on the site and be responsible for any mistakes he may make and their results. If the Contractor discovers any discrepancy, in figures on the drawings, he shall report same to the Architect/Engineer and Owner before proceeding with any work affected by the discrepancy and shall be held responsible for results should he fail to make such reports.

1.21 EXTRAS

A. Without invalidating the Contract, the Owner may order extra work or make changes by altering, adding to, or deducting from the work, the Contract sum being adjusted accordingly, and the consent of the Surety being first obtained where necessary or desirable. All work of the kind Bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Owner, and the price is stated in such order.

B. Requests for compensation, for previously approved Change Orders omitted from an Application for Payment, received sixty (60) calendar days after Owner receipt of the Final Application for Payment (Release of Retainage) shall not be honored.

1.22 GENERAL GUARANTY

A. Neither the final certificate of payment nor any provision in the Contract documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified.

PART 2 – NOT USED

PART 3– NOT USED

END OF SECTION 00 20 20

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PART 1 - GENERAL

1.01 DESCRIPTION

A. The project is located on the campus of Indiana State University at Cunningham Memorial Library, 510 North 6 1/2 Street, Terre Haute, Indiana 47809

1.02 RELATED SECTIONS

A. Division 00 Sections

B. Division 01 Sections

C. All Division 02-33 Sections as applicable

1.03 SCOPE OF WORK – BASE BID

A. The following, but not limited to, is included in the Base Bid Package:

1. Construction of Ricoh Copy Center

a. New walls
b. New finishes
c. New storefront entry
d. New ceiling and Lighting
e. Mechanical and Electrical
f. New counter and storage work surfaces

B. Procedures

1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Base Bid into the Project.

2. Include as part of the Base Bid miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the Base Bid.

1.04 SCOPE OF WORK – ALTERNATES

A. The following, but not limited to, is included in the Alternate(s)

There are no Alternates requested

B. The cost or credit for each Alternate is the net addition to or deduction from the Contract Sum to incorporate Alternate into the Work. No other adjustments are made to the Contract Sum.

C. Procedures

1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the Alternate into the Project.

2. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of Alternate.

3. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each Alternate. Indicate if Alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to Alternates.

4. Execute accepted Alternates under the same conditions as other work of the Contract.

D. Selection and Award of Alternates: The Owner reserves the right to selectively accept or reject Alternates at their discretion and is under no obligation to accept any Alternates.

1.05 BID SUBMISSION REQUIREMENTS

A. Bids shall be submitted on the included Bid Form (Section 00 20 00) and will be reviewed and accepted or rejected at the Owner's option.

B. All Bids shall be held for a period of One Hundred Twenty (120) Calendar days after submission of the Bid.

1.06 RELATED WORK SPECIFIED ELSEWHERE

A. The Prime Contractor shall be aware, and shall make his subcontractors aware that the requirements in the sections of Divisions 00 and 01 pertain to all the work and they are binding on each section of these specifications as if they were repeated in each section in their entirety.

B. The Prime Contractor shall be responsible for understanding the scope and intent of the work in all sections of these Specifications

C. The Prime Contractor is responsible for review of all sections of the Specifications and all Drawings to confirm any additional areas of responsibility.

D. All Contractors are responsible for their area of work which might show up only on a drawing from another series or Specification section.

1.07 CONTRACTS

A. Work shall be performed under one Prime Contract.

1.08 PRIME CONTRACTOR'S DUTIES

A. Project Supervision: see Section 00 20 20 item 1.09 for requirements

B. Except as specifically noted, provide and pay for:
   1. Labor, materials and equipment
   2. Tools, construction equipment and machinery
   3. Other facilities and services necessary for proper execution and completion of work

C. Pay legally required State and Federal Taxes.

D. Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay. Contractor shall coordinate his work in advance with all other trades and report immediately any difficulty which can be anticipated.

E. The Contract Documents shall be carefully studied by the Contractor during the course of construction. Any errors in layout or errors of omission which are discovered shall be referred immediately to the Architect/Engineer for interpretation or correction.

F. Secure and pay for, as necessary for proper execution and completion of work, and as applicable at time of receipt of bids:

   1. Permits
   2. Licenses

G. Give required notices.

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

I. Promptly submit written notice to Architect/Engineer of observed variances of Contract Documents from legal requirements.

J. Enforce strict discipline and good order among employees.

K. Coordinate delivery and installation dates with Architect/Engineer and Owner and incorporate into Construction Schedule.

L. Prepare and update Construction Schedule.

M. Notify and receive approval from the Owner at least 48 hours in advance for utility connections, or shut-off. Coordinate these operations with the Owner, through the

Architect/Engineer, and complete the work in the minimum amount of time.

N. Notify the Architect/Engineer in writing when work is completed and keep the Architect/Engineer informed of the progress of the work. No work shall be closed or covered until it has been inspected and approved. Should work not inspected be covered, uncover all such work so that it can be properly inspected and after such inspection, properly repair and replace all of the work at no additional cost to the Owner.

O. Where the Contract Documents require any work to be tested, the Architect/Engineer shall be notified sufficiently in advance so that he may observe such tests.

P. Contractor shall submit a copy of any permits he has secured before starting work on this project unless otherwise stated by Owner.

Q. Where the Contract Documents require the use of AIA Documents including, but not limited to, G702 Application and Certificate for Payment and G703 Continuation Sheet.

R. For Projects in excess of $150,000.00 submit with each Application for Payment the Owner's Mandatory Tier II Spend Report using the ISU Business Diversity Spend Reporting Form for Construction/Renovation/Facilities Repair Projects per instructions on the Section 00 10 41 Tier II Spending Reporting Form.

1.09 OTHER REQUIREMENTS

A. Nightly the Prime Contractor shall secure the construction site to discourage unauthorized individuals from accessing the site. Special effort to secure the site shall be made on Friday evenings.

B. While the site shall be kept orderly at all times, weekly the Prime Contractor shall clean-up the construction site of:

1. Any accumulated trash and rubbish.
2. Dirt, dust, mud, etc. associated with the construction process.
3. Salvaged materials not slated for re-use and excess materials not slated for use.

C. Weed and grass control: The Prime Contractor shall maintain weeds or grasses to less than 6" in height where applicable

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 10 00

PART 1 – GENERAL

1.01 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.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Contingency allowances.
4. Testing and inspecting allowances.
5. Quantity allowances.

C. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.03 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

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

1.04 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

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

1.05 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.06 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.07 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.02 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.03 SCHEDULE OF ALLOWANCES

A. Allowance # 1: A $15,000.00 Allowance shall be included in the Base Bid for Unforeseen Conditions and General Construction Contingency. It is solely at the discretion of the Architect/Engineer/Owner what costs may be applied to this Allowance. Any unused Allowance monies shall be returned to the Owner at Project closeout by Change Order.

END OF SECTION 01 23 60

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Schedule of Values

B. Application for Payment

C. Change procedures

D. Alternates

E. Substantial Completion

F. Final Completion

1.02 SCHEDULE OF VALUES

A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or similar form.

B. Submit Schedule of Values electronically in PDF format within 15 calendar days after date of the Award Letter.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization, bonds and insurance, and other overhead costs.

D. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

E. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

F. Revise schedule if additional Alternates are Awarded after the initial Award by adding these Alternates as separate line items broken down in detail as was provided in the initial approved Schedule of Values.

G. Revise schedule to list approved Change Orders, broken down in detail as was provided in the initial approved Schedule of Values.

H. Submit "Consent of Surety to Schedule of Values" with Schedule of Values.

1.03 APPLICATIONS FOR PAYMENT

A. Submit four (4) copies of each application on AIA Form G702- Application and Certificate for Payment and AIA G703 - Continuation Sheet or similar.

B. Content and Format: Utilize most current approved Schedule of Values for listing items in each Application for Payment.

C. Payment Period: As indicated in the Contract Documents.

D. Waiver of Liens.

E. Include Certified Payroll forms if required by Owner.

1.04 CHANGE PROCEDURES

A. The Architect/Engineer will advise of minor changes in the Work not involving and adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2007 Edition, Paragraph 7.4 by issuing supplemental instructions on AIA Form G710 or ISU Form SI/FCC-12.

1. The Architect/Engineer may issue a Request for Proposal (RFP) which includes A detailed description of a proposed change, with supplementary or revised Drawings and

Specifications if required. Contractor shall prepare and submit an estimate within10 calendar days, listing if:

a. A change in Contract Time for executing the change is requested.

b. A stipulation of any overtime work required

c. The period of time during which the requested price will be considered valid, but not less than 21 calendar days.

B. The Contractor may propose changes by submitting a request for change, Change Proposal (CP), to the Architect/Engineer, describing the proposed change and its full effect on the Work.

1. Include a statement describing:

a. The reason for the change.

b. The effect on the Contract Sum/Price and Contract Time with full documentation.

c. A statement describing the effect on Work by separate or other Contractors.

d. A stipulation of any overtime work required.

e. The period of time during which the requested price will be considered valid, but not less than 21 calendar days.

C. RFP and CP Pricing

1. Project Supervision costs:

a. Section 00 20 20 Item 1.09 states in part:

"The Prime Contractor shall maintain on the Project site a competent Project Superintendent at all times any work is being performed; either by the Prime Contractor's workers or any Subcontractor's workers."

b. There shall be no costs included in the pricing of a RFP or CP for Project Superintendent's Supervision Hours while the work is being performed unless the Work included in the RFP/CP pricing will occur at a time not with-in the normal scheduled Project hours of construction.

2. Contractor Mark-up and Allowable Charges

a. Section 00 20 11 2.07 Subparagraph 3.3.3.7, 3.3.3.8 and 3.3.3.9 states:

".7 Extra Work shall be performed for the cost of the labor payroll plus 15% of the labor payroll and the cost of the material plus 5% of the material cost. Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work. Labor payroll is defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.

.8 In case such Work is performed by a Subcontractor or a lower tier Contractor with the Owner's consent, the Work shall be marked up as indicated in 7.3.3.7 by the Contractor actually performing the Work. Each succeeding Contractor may mark up their direct labor and material costs as indicated in 7.3.3.7. Otherwise each succeeding Contractor, including the Prime Contractor, may add 5% for handling/ coordination. Additional mark-ups of a Subcontractor's costs shall not be permitted.

".9 Costs for bond premiums are allowable provided documentation from the Bonding Company is included detailing the added bond cost premium, the current bond total and the new bond total."

b. Labor charges subject to the 15% mark-up shall be based on the actual labor payroll defined as the actual hourly labor cost plus any fringes payable as listed on the wage rate schedule(s) provided as required by the Bidding Documents.". The Wage Rate Schedule, submitted as required by the Contract Documents, shall be used to determine if the hourly labor rate used for pricing and labor mark-up is correct.

c. Insurance, Taxes and similar shall not be included in the RFP or CP pricing since, per 3.3.3.7, "Said markup fees are intended to compensate for the cost of payroll taxes, insurance of all kinds, all taxes of the Contractor, including State Taxes, Federal Income Tax, Unemployment, and FICA Taxes, as well as all other overhead costs, expenses, and carrying charges whatsoever, including the profit to be derived from such additional Work".

3. All RFP and CP pricing shall be submitted in enough detail for the Architect/Engineer and Owner to properly evaluate the proposed pricing. These pricing details extend to the lower tier Subcontractor's pricing as well. The Architect/Engineer and Owner may request additional pricing breakdown if in their opinion insufficient pricing detail was provided for evaluation. The Contractor shall promptly provide the additional pricing detail.

D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer and Owner.

E. Construction Change Directive: Architect/Engineer may issue a directive, on AIA Form G713 or ISU Form CCD-18 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

F. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

G. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.05 ALTERNATES

A. Alternate Bid prices shall be held for one hundred twenty (120) days from date of Bid.

B. Alternate Bids may be used as the basis for Award of Contract.

C. The Owner may Award none, some or all Alternates submitted.

D. The Owner is under no obligation to accept any Alternates submitted.

E. Accepted Alternates shall be listed as separate line items on the Schedule of Values broken down as directed by the Architect/Engineer/Owner.

1.06 SUBSTANTIAL COMPLETION

A. The substantial completion date shall be as listed in Section 001010 INSTRUCTIONS TO BIDDERS. The substantial completion date may be adjusted as allowed by the Contract Documents or as mutually agreed upon in writing by the Owner and Contractor.

B. **Should a Contractor list an early substantial completion date on their Project Schedule or any Project Document, this early substantial completion date shall not be permitted to be used as a claim for additional compensation for the Contractor's failure to meet their early substantial completion date.**

C. Warranty: The Warranty Period shall commence at substantial completion per AIA A201-2007 Article 3 Paragraph 3.5 as amended by Specification Section 00 20 11 AMENDMENTS TO GENERAL CONDITIONS.

1.07 FINAL COMPLETION

A. The Contractor's final Application for Payment (Release of Retainage) shall not be approved for payment until all punch list items are complete, all claims (Contractor and Subcontractor) have been resolved and all conditions of Section 01 77 00 PROJECT CLOSEOUT have been met.

B. Requests for compensation, for previously approved Change Orders omitted from an Application for Payment, received sixty (60) calendar days after receipt of the Final Application for Payment (Release of Retainage) shall not be honored.

C. Final payment will be due and payable the late of sixty-one (61) days from date of receipt of the Final Application for Payment or after the Contractor has completed all punch list items, certified that all Subcontractors and Suppliers have been paid, and all claims, including the Contractor's, have been resolved. Before issuance of the final payment, the Contractor shall furnish an affidavit (Final Waiver of Lien) as evidence that there are no claims on account of the Contract, outstanding liens of claims for materials furnished, or labor performed on the work. The final payment shall constitute the acceptance of the work by the Owner, except as to work thereafter found to be defective. The date of such payment shall be regarded as the date of final acceptance of the work.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 25 00

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Coordination.

B. Field engineering.

C. Preconstruction meeting.

D. Progress meetings.

E. Field Record Drawings and Specifications

1.02 COORDINATION

A. Coordination scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provision for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. The Contractor shall provide coordination drawings for above-ceiling areas where at least two different services run in parallel or cross one another. Drawings are to be submitted, reviewed by the consultant team, and returned to the contractor prior to the start of any installation in these areas.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

G. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 FIELD ENGINEERING

A. Contractor to locate and protect survey control and reference points.

B. Control datum for survey is that established by Owner provided survey and/or shown on Drawings.

C. Verify set-backs and easements, confirm drawing dimensions and elevations.

D. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

E. Submit a copy of registered site drawing and certificate signed by the Land Surveyor that the elevations and locations of the Work is in conformance with the Contract Documents.

1.04 PRECONSTRUCTION MEETING

A. Architect/Engineer will schedule a meeting after Notice of Award.

B. Attendance Required: Owner, Architect/Engineer, Contractor and major subcontractors.

C. Agenda:
   1. Introductions.
      a. Official Project Name and Number (to appear on all Project correspondence)
      b. Designation of personnel representing the parties in Contract, Owner and the Architect/Engineer
   2. Status of required paperwork to ISU Purchasing Department.
   3. Distribution of Contract Documents.
   4. Submission of full list of sub-contractors and suppliers, schedule of values, proposed pay application schedule and proposed project schedule.
   5. Procedures and processing of submittals, substitutions, field decisions, proposal request, Change Orders, and Contract closeout procedures.
   6. Scheduling activities of a Testing Agency (if required).
   7. Use of premise by Owner and Contractor.
   8. Owner's requirements and partial occupancy.
   9. Construction facilities and controls provided by Owner.
   10. Temporary utilities.
   11. Survey and building layout.
   12. Security and housekeeping procedures.
   13. Procedures for testing.
   14. Procedures for maintaining record documents.

D. Architect/Engineer to record minutes and distribute copies within seven (7) days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

1.05 PROGRESS MEETINGS

A. Schedule and attend meetings throughout progress of the Work at maximum monthly intervals.

B. Architect/Engineer will make arrangements for meetings, prepare agenda with copies for participant and preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, and Architect/Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems which impede planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
   10. Coordination of projected progress.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule
   13. Other business relating to Work.

E. Architect/Engineer to record minutes and distribute copies within seven (7) days after meeting to participants, with copies to the Owner, and those affected by decisions made.

1.06 FIELD PROJECT RECORD DOCUMENTS

A. Documents and Samples at the Site:

1. General: The Prime Contractor shall maintain at the site for the Owner and A/E a record copy of the Drawings, Specifications, addenda, bulletins, Architect/Engineer's Supplemental Instructions, and Change Orders, in good order and marked currently to record changes and selections made during construction, and in addition reviewed Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Owner and the Architect/Engineer review.

2. Posting:

a. Record Drawings: Keep a complete record of the locations of all items indicating the Work as actually installed. Changes and deviations are to be indicated on the Record Contract Drawings. Give particular attention to concealed work which would be difficult to identify, measure, and record at a later date. The Subcontractor shall record concealed items, changes, and deviations under the direction of the Contractor as the Work progresses. The Contractor shall clearly identify all deviations from the Contract Documents.

b. Record Specifications: Indicate the changes made by addendum, bulletin, Architect/Engineer's Supplemental Instructions, and Change Order. Indicate the manufacturer selected for all items whether specified proprietarily or generally.

c. No review of record documents by the Architect/Engineer/Owner shall be a waiver of deviations from the Contract Documents or the submittals, or in any way relieve the Contractor from his responsibility to perform the Work in accordance with the Contract Documents.

PART 2 - NOT USED

PART 3 – NOT USED

END OF SECTION 01 31 00

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PART 1 - GENERAL

1.01 DESCRIPTION

A. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.

B. To ensure that the specified products are furnished and installed in accordance with the design intent, procedures have been established for advance submittal of design data and for its review by the Architect/Engineer.

C. The Architect/Engineer's review of Contractor's material submittal shall not relieve the Contractor of responsibility for errors, omission, quantities, or capacities even though work is executed in accordance with the reviewed/approved submittal material.

D. The checking of the Contractor's Material Submittal is a gratuitous assistance and the Architect/Engineer does not thereby assume responsibility or liability for errors or omissions. Where such errors or omissions are discovered later, they shall be made good by the Contractor, irrespective of any review/approval by the Architect/Engineer since Contractor's Proposal assumes a complete, operable, and acceptable installation.

E. Work Included:

1. Submit, to the Architect/Engineer, shop drawings, project data and samples required by Specification sections electronically in PDF format.

2. Simultaneous to submitting to the Architect/Engineer, the Contractor shall submit to the Owner’s designated contacts a copy of all submittals provided to the Architect/Engineer in PDF Format.

3. All submittals shall be separated by CSI format and shall list the appropriate CSI 6-digit code on the PDF file name. Submittal packages which include items listed under different Specification sections shall be submitted as separate PDF Files. Multiple submittals at different times under the same Specification Section shall have file name extension added to indicate the number of the submittal, e.g. 26 51 00(1), 26 51 00(2), etc.

4. Designate in construction schedule dates for submission and dates reviewed shop drawings, project data and samples will be needed for each product in order to maintain the progress of construction as scheduled. Also indicate critical delivery dates of all items.

5. Any submittal that requires expedited review shall be noted on the submittal cover page with a “required by” review date listed. A Contractor’s failure to submit in a timely manner is not cause to request an expedited review.

1.02 PRODUCT HANDLING

A. Make all submittals of shop drawings, samples, requests for substitution, and other similar items, in strict accordance with the provisions of this section of these Specifications.

1.03 DEFINITIONS

A. Shop Drawings:

1. Original drawings, prepared by Contractor, subcontractor, supplier or distributor, which illustrate some portion of the work, showing fabrication, layout, setting or erection details.
   a. Prepared by a qualified detailer
   b. Identify details by reference to sheet and detail numbers shown on contract drawings.

B. Product Data:
   1. Manufacturer's standard schematic drawings:
      a. Scanned copies of schematic drawings from hard copy paper catalog pages are not acceptable. Obtain PDF files of schematic drawings from the Supplier/Manufacturer for submission.
      b. Modify drawings to delete information which is not applicable to project.
      c. Supplement standard information to provide additional information applicable to project.
   2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
      a. Scanned copies of catalog sheets from hard copy paper catalog pages are not acceptable. Obtain PDF files of items from the Supplier/Manufacturer for submission.
      b. Clearly mark each item to identify pertinent materials, products, or models to be provided.
      c. Show dimensions and clearances required.
      d. Show performance characteristics and capabilities.
      e. Show wiring diagrams and controls.
   3. Material and Safety Data Sheets shall be furnished for all applicable Project Materials.

1.04 SUBMITTAL REVIEW TIME

A. Every effort will be made to return submittals within ten (10) calendar days or less.

B. This ten (10) days may require adjustment based on, but not limited to, the following:
   1. Complexity of the submittal
   2. Size of the job and number of items included in the submittal
   3. Number of submittals received at the same time or on the same day

C. Submittals received that do not clearly indicate the items being provided on the submittal will be returned marked “Rejected Resubmit” which will further delay the submittal return time.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS

A. Scale required: Unless otherwise specifically directed by the Architect/Engineer, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the work.

B. All shop drawings shall be submitted electronically in PDF Format to the Architect/Engineer with a simultaneous submission to the Owner’s designated recipients.

C. Accompany shop drawings with transmittal letter containing:
   1. Date and revision dates
   2. Project title and number
   3. The names of:
      a. Architect/Engineer
      b. Contractor
      c. Subcontractor
      d. Supplier
      e. Manufacturer
      f. Separate detailer when pertinent

4. Identification of product or material
5. Relation to adjacent structure or materials
6. Field dimensions, clearly identified as such
7. Specification section number
8. Applicable standards, such as ASTM number of Federal Specification
9. A blank space 2-1/2" x 3", for the Architect/Engineer's electronic stamp

D. Identification of deviations from Contract Documents

E. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents. Any materials submitted without the Contractor's stamp of approval will be returned to the Contractor with no action taken.

F. Reviewed shop drawings shall be returned to the Contractor and Owner’s designated recipients electronically stamped as follows:
1. Reviewed
2. Reviewed as Noted
3. Rejected - Resubmit

G. The Owner shall submit their review comments to the Architect/Engineer. Official Review of shop drawings shall be by the Architect/Engineer only. The Contractor shall not proceed based on Owner comments only unless the Owner is the Architect/Engineer.

2.02 SUBMITTALS

A. All submittals for materials and equipment shall be made within forty (40) days of award of the contract and in no case shall any materials or equipment be delivered to the job site until submittals have been reviewed by the Architect/Engineer and Owner. This requirement will be a condition for approval of subsequent Applications for Payment.

B. All submittals shall be submitted electronically in PDF Format to the Architect/Engineer with a simultaneous submission to the Owner’s designated recipients.

C. Submittals which reflect color samples shall be submitted in color.

D. Accompany submittals with transmittal letter containing:
1. Date and revision dates
2. Project title and number
3. The names of:
a. Architect/Engineer
b. Contractor
c. Subcontractor
d. Supplier
e. Manufacturer
f. Separate detailer when pertinent
4. Identification of product or material
5. Relation to adjacent structure or materials
6. Field dimensions, clearly identified as such
7. Specification section number
8. Applicable standards, such as ASTM number of Federal Specification
9. A blank space 2-1/2" x 3", for the Architect/Engineer's electronic stamp

E. Identification of deviations from Contract Documents

F. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field

measurements and compliance with Contract Documents. Any materials submitted without the Contractor's stamp of approval will be returned to the Contractor with no action taken.

G. Reviewed submittals shall be returned to the Contractor electronically stamped as follows:

1. Reviewed
2. Reviewed as Noted
3. Rejected - Resubmit

H. The Owner shall submit their review comments to the Architect/Engineer. Official Review of submittals shall be by the Architect/Engineer only. The Contractor shall not proceed based on Owner comments only unless the Owner is the Architect/Engineer.

2.03 SAMPLES

A. Physical samples as defined by the General Conditions shall be furnished to the Architect/Engineer for approval prior to ordering or fabrication of any product.

B. Submit samples as specified in each of specification sections.

C. Submit an electronic transmittal or review sheet stamped by the Contractor with a blank space for the Architect/Engineer’s electronic stamp.

2.04 SUBSTITUTIONS DURING CONSTRUCTION

A. The approved "Suppliers and Manufacturers List" is an essential part of the Contract. Substitutions of materials, equipment, etc. require the written approval of the Architect/Engineer and Owner. Substitutions during construction will only be considered when there is a proven benefit to the Owner. It is at the sole discretion of the Architect/Engineer and Owner to determine if the substitution is warranted.

1. The Architect/Engineer and Owner will consider proposals for substitution of specified materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect/Engineer and Owner to evaluate the proposed substitution. Also, submit with request accurate cost data on the proposed substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.

2. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Architect/Engineer and Owner.

3. Requests for substitution, when forwarded by the Contractor to the Architect/Engineer and Owner, are understood to mean that the Contractor:

a. Represents that they have personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
b. Will provide the same guarantee for the substitution that they would for that specified;
c. Certifies that the cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate contracts and the Architect's redesign cost, and that he waives all claims for additional cost related to the substitution which subsequently become apparent;
d. Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

B. See Section 00 10 10 INSTRUCTIONS TO BIDDERS Item 1.08 for requirements for substitutions prior to Bid.

PART 3 – NOT USED

END OF SECTION 01 32 00

01 40 00
QUALITY CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Quality assurance - control of installation.

B. Tolerances

C. References.

D. Mockup.

E. Inspecting and testing laboratory services.

F. Manufacturer's field services and reports.

1.02 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions, including each step in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.04 REFERENCES

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect/Engineer shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 INSPECTING AND TESTING LABORATORY SERVICES

A. See Section 01 41 00 for requirements for the selection of Inspection and Testing Laboratory Services Testing Agency (Agencies) and responsibility for payment for these services.

B. An independent firm will perform inspections, tests, and other services specified in individual specification sections and as required by the Architect/Engineer or the Owner.

C. Inspecting, testing, and source quality control may occur on or off the project site. Perform off-site inspecting or testing as required by the Architect/Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

F. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.

G. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

H. Testing or inspecting does not relieve Contractor to perform Work to contact requirements.

I. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for retesting will be paid by the Contractor.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observations. Observer subject to approval of Architect/Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

D. Submit report in duplicate within 30 days of observations to Architect/Engineer for information.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 40 00

01 41 00
TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 SUMMARY

A. This Section describes testing and inspecting to be provided by the Contractor, plus cooperation required from the Contractor with the Owner's selected testing agency and others responsible for testing and inspecting the Work. This Section supersedes all references within the Contract Documents to Contractor provided testing.

B. Related Work:

1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 01 of these Specifications.

2. Requirements for testing may be described in various Sections of these Specifications.

3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

C. Work not included:

1. Selection of testing laboratory: The Owner will select a prequalified independent testing laboratory.

2. Selection of construction soil engineer: The Owner will select a prequalified independent soil engineer to observe performance of Work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests.

1.02 QUALITY ASSURANCE

A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Testing, when required, will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

C. Promptly process and distribute required copies of test reports and related instructions to assure necessary testing and replacement of materials with the least possible delay in progress of the Work.

PART 2 – PRODUCTS

2.01 PAYMENT FOR TESTING

A. Initial services of testing laboratory:

1. The Owner will pay for initial services requested by the Owner.

2. When initial tests indicate non-compliance with the Contract Documents, the costs of all tests associated with that non-compliance will be deducted by the Owner from the Contract Sum.

B. Initial services of Construction Soil Engineer:

1. The Owner will pay for initial services requested by the Owner, including but not necessarily limited to, observing performance of Work in connection with excavating, trenching, filling, backfilling and grading.

2. The Owner will pay for compaction tests performed by the construction soil engineer, but will deduct from the Contract Sum the costs for compaction tests performed to prove compliance with codes or ordinances.

3. Retesting: When initial tests indicate non-compliance with the Contract Documents, subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency, and costs thereof will be deducted by the Owner from the Contract Sum.

2.02 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

2.03 CONTRACTOR'S CONVENIENCE TESTING

A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3 – EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.02 TAKING SPECIMENS

A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.03 SCHEDULES FOR TESTING

A. Establishing schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide testing laboratory with a minimum of 24 hours advance notice.

3. Provide all required time within the construction schedule.

B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

END OF SECTION 01 41 00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

A. General: This section specifies procedural and administrative requirements for compliance with governing regulations and the codes and standards imposed upon the work. The requirements include the obtaining of permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.

B. "Regulations" is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

C. Governing Regulations: Refer to General and Supplementary Conditions for requirement related to compliance with governing regulations.

1.03 DEFINITIONS

A. General Explanation: A substantial amount of specification language consists of definitions for terms found in other Contract Documents, including drawings. (Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated thereon). Certain terms used in Contract Documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the work to the extent that they are not stated more explicitly in another element of the Contract Documents.

B. General Requirements: The provisions or requirements of Division 00 and Division 01 sections apply to entire work of Contract and, where so indicated, to other elements which are included in project.

C. Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled" and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted", mean "directed by Architect/Engineer", "requested by Architect/Engineer", and similar phrases. However, no such implied meaning will be interpreted to extend Architect's/Engineer's responsibility into the Contractor's area of construction supervision.

E. Approve: Where used in conjunction with Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be held to limitations of Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

F. Project Site: The term "project site" is defined as the space available to the Contractor for performance of the work, wither exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings, and may or may not be identical with description of the land upon which project is to be built.

G. Furnish: Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations, as applicable in each instance.

H. Install: Except as otherwise defined in greater detail, term "install" is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

I. Provide: Except as otherwise defined in greater detail, term "provide" means to furnish and install, complete and ready for intended use, as applicable in each instance.

J. Installer: The term "installer" is defined as the entity (person or firm) engaged by the Contractor, its Subcontractor or Sub-subcontractor for performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a requirement that installers be expert in the operations they are engaged to perform.

K. Testing Laboratories: The term "testing laboratory" is defined as an independent entity engaged to perform specific inspections or tests of the work, either at the project site or elsewhere; and to report and, if required, interpret results of those inspections or tests.

1.04 PROJECT MANUAL FORMAT AND CONTENT EXPLANATION

A. General: This article is provided to help the user of these specifications more readily understand the format, language, implied requirements and similar conventions of content. None of the following explanations shall be interpreted to modify the substance of the contract requirements.

B. Production Methods: Portions of these specifications have been produced by the Architect's/Engineer's standard method of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a natural result of this production technique, and no other meaning shall be implied.

C. Project Manual Format: These specifications are organized based upon the Construction Specifications Institute's 33 Division format. The organization of these specifications into Divisions, Sections or Trade Headings generally conforms to recognized industry practice.

1. Divisions are groupings of related or similar sections. The divisions are recognized as the construction industry consensus method of uniform specification organization.

2. Sections: For convenience, "Sections" are considered as the basic units of work. The section title is descriptive only and not intended to limit the meaning or content of a section or to be completely descriptive of requirements specified therein.

3. Section Numbering is used to facilitate cross-references in the Contract Documents. Sections are placed in the Project Manual in numeric sequence; however, the numeric sequence is not complete and the listing of the section in the "Index" at the beginning of the Project Manual must be consulted to determine the numbers and names of specifications sections in the Contract Documents.

D. Project Identification: The project number of the Contract Documents is the Bid Number recorded on the Project Manual Cover Sheet, in Section 00 10 00 Notice to Bidders and Section 00 20 00 Bid Form.

E. Page Numbering: Pages are numbered independently for each section. The section number is shown together with the page number at the bottom of each page to facilitate the location of text in the Project Manual.

F. Text Subordination: Portions of specification text are subordinated to other portions in the following manner:

1. Certain sections may be subordinate to other sections or parts of other sections. When that occurs, the degree of subordination is described in those sections.

2. Sub-articles, which are printed in upper/lower case lettering, are subordinate to Article titles.

3. Paragraphs and lines of text are subordinate to sub-article titles.

4. Paragraphs and lines of text that are indented from the left margin are subordinate to the preceding text that is either not indented, or is indented by a lesser amount.

G. Project Manual Content: This project specification has been produced employing certain conventions in the use of language as well as conventions regarding the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. In certain circumstances, the language of the specifications and other Contract Documents is of the abbreviated type. It implies words and meanings that will be appropriately interpreted. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where the full context of the Contract Documents so indicates.

2. Imperative language is generally used in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by Contractor. At certain locations in the text, for clarity of reading, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by Contractor or, when so noted, by others.

H. Methods of Specifying: The techniques or methods of specifying requirements varies throughout the text.

1. The method used for specifying one unit or work has no bearing on requirements for another unit of work.

2. Methods of specifying may include the following, or any combination of the following:

a. Prescriptive.

b. Open-generic-descriptive.

c. Performance.

d. Proprietary.

e. Compliance with reference standards.

I. Specialists Assignments: In certain instances, specification text requires or implies that specific elements of the work are to be assigned to specialists or expert entities, who must be engaged for the performance of the work. Such assignments are intended to establish which part or entity involved in a specific element of the work is considered as being sufficiently experienced in the indicated construction processes or operations to be recognized as "expert" in those processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of all contract requirements remains with the Contractor.

J. These requirements should not be interpreted to conflict with the enforcement of building codes and similar regulations governing the work. They are also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

K. Trades: Except as otherwise indicated, the use of titles such as "Carpentry" in specification text, is not intended to imply that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"). It is also not intended to

imply that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

1.05 DRAWING SYMBOL

A. General: Except as otherwise noted indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., latest edition.

B. Mechanical/Electrical Drawings: Graphic symbols used on mechanical/electrical drawings are generally aligned with symbols recommend by ASHRAE. Where appropriate, these symbols supplemented by more specific symbols as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to the Architect/Engineer for clarification before proceeding.

1.06 INDUSTRY STANDARDS

A. General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written into the Contract Documents, applicable standards of the construction industry have the same force and effect as if copied directly into the Contract Documents. Such industry standards are hereby made a part of the Contract Documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available for reference at the project site.

B. Referenced standards (standard referenced directly in Contract Documents) have precedence over non-referenced standards which are recognized in industry for applicability to work.

C. Non-referenced standards are hereby defined as not being applicable to the work, except as general requirement of whether the work complies with recognized construction industry standards.

D. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.

E. Updated Standards: At the request of the Architect/Engineer, Contractor or governing authority, submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of the Contract Documents and before the performance of the work affected. The Architect/Engineer will decide whether to issue the change order to proceed with the updated standard.

F. Conflicting Requirements: Where compliance with 2 or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.

G. Minimum Quantities or Quality Levels: In every instance, the quantity or quality level shown or specified is intended to be the minimum for the work to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Architect/Engineer for decision before proceeding.

H. Copies of Standards: Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with recognized industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.

I. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.

J. Although certain copies of standards needed for enforcement of the requirements may be required submittals, the Architect/Engineer reserves the right to require the Contractor to submit additional copies of these standards as necessary for enforcement of the requirements.

K. Abbreviations and Names: Where acronyms or abbreviations are used in the specifications or other Contract Documents they are defined to mean the industry recognized name of the trade association, standards generating organization, governing authority or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

1.07 GOVERNING REGULATIONS/AUTHORITIES

A. General: The procedure followed by Architect/Engineer has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing Contract Documents; recognized that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions having a bearing on performance of work.

B. Trade Union Jurisdictions: The Contractor shall maintain, and shall require Prime Subcontractor to maintain, complete current information on jurisdictional matters, regulations actions and pending actions, as applicable to the work. Discuss new developments at appropriate project meetings at the earliest feasible dates, and record information of relevance along with the actions agreed upon. The manner in which Contract Documents have been organized and subdivided is not intended to be an indication of jurisdictional or trade union agreements. Assign and subcontract the work, and employ trades-men laborers, in a manner which will not unduly risk jurisdictional disputes of kind which could result in conflicts, delays, claims and losses in the performance of the work.

1.08 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 42 00

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PART 1 – GENERAL

1.01 CONTRACTOR'S USE OF PREMISES AND FACILITIES

A. Confine operations at site to areas permitted by:

1. Construction Limits
2. Contract Documents
3. Written Owner Approval

B. Do not load structure with weight that will endanger structure or existing adjacent structures including any subsurface construction.

C. The Prime Contractor shall assume full responsibility for protection and safekeeping of product stored on premises.

D. The Prime Contractor shall move any stored products which interfere with operations of Owner or other Contractor.

E. The activities of the Prime Contractor, including his subcontractors, material suppliers, employees, and others engaged in the work, shall be strictly limited to the Owner's property. Under no circumstances shall parking, material storage, or other uses of adjacent private property be permitted. Locations of storage areas, field office, parking areas, and the like on the project site shall be only within the construction limits as indicated on the drawings or as approved by the Owner.

F. Use of Installed Work: Construction personnel may use toilet facilities, sink, and other fixtures and equipment installed in work only as expressly permitted by Architect/Engineer or Owner. Any privileges granted may be revoked if abused.

G. Construction personnel shall exercise care and shall provide whatever protective measures are required to assure that their particular portions of the work do not damage or alter portions of the work that have been previously installed, either partially or completely. All work so damaged or altered shall be repaired or replaced to the satisfaction of the Architect by the party whose work has been affected, and the expense thereof shall be borne by the party who caused the damage or alteration.

H. Protection of Floors: In interior areas used for construction or field "shops", protect floors from physical damage, oil drippings, and other staining which might impair bonding of new floor coverings, utilizing such methods as heavy polyethylene covering, sawdust or sand boxes, rigid insulation or the like.

1.02 FIELD OFFICE

A. The Prime Contractor and their Sub-Contractors shall be responsible for their own field office.

B. The Prime Contractor shall provide telephone service, including cellular phone for the on-site foreman, for the duration of the project.

C. Provide at all times fire extinguishers as required by applicable codes and regulations.

D. Post in a conspicuous space near the telephone, pertinent emergency phone numbers and notices as may be required by governing authorities and fire protection department.

1.03 SITE PROTECTION

A. Contractor shall adhere to Factory Mutual Engineering and Research (FM) "Cutting and Welding" permit system. Permits are available through the Office of Environmental Safety’s Fire Specialist Office at 812-237-4020.

B. Prime Contractor shall provide a one hour fire watch at the end of each workday when any cutting or welding occurred to assure that no possibility of fire exists from any work performed that day.

1.04 TEMPORARY ELECTRIC SERVICE

A. Responsibility: The Prime Contractor shall be allowed to utilize the Owner's electricity for all construction purposes. The Prime Contractor shall arrange for the distribution and continuance throughout the work and the removal at the completion of the work of temporary electrical service. All electrical installations shall be by a Licensed Bonded Electrical Contractor. All elements of such temporary electric service shall conform to the regulations of the National Electric Code, current edition, and OSHA. All temporary wiring shall include a green equipment grounding conductor, and the entire temporary electrical service shall have equipment grounding continuity; all outlets for the connection of portable equipment shall be of the GFCI type. The Contractor shall provide all necessary wiring. The Prime Contractor or their Sub Contractor shall provide extension cords, outlets, etc. required to extend temporary service from nearest outlets of adequate capacity for the power required to points of usage.

B. Distribution Wiring: The temporary distribution wiring shall be adequate to provide whatever is required for the operation of 120 volts, single-phase portable tools and equipment not exceeding one horsepower; the distribution wiring shall provide a receptacle within 50 feet of all portions of the building area.

C. Temporary Lighting: The Prime Contractor shall provide all wiring, light bulbs and fixtures necessary to furnish temporary lighting of one watt per sq. ft. of construction area, but provide a minimum of one light in each enclosed space. Keep such temporary lighting in operation during all working periods.

D. Supervision: The Prime Contractor shall maintain strict supervision over the use of the temporary electrical service and shall be responsible for damages incurred by misuse.

1.05 TEMPORARY WATER SERVICE

A. The Prime Contractor may use the Owner's existing water service for construction purposes. The Prime Contractor shall provide and maintain leak-free, all hoses, fitting, nozzles, and the like required to distribute water to points of usage. Maintain strict supervision over use and waste of water. Take care not to spill or run water in any part of the building. Repair, replace, or restore (whichever may be deemed necessary by the Architect/Engineer) at no additional cost to the Owner, all work, new or existing, including equipment, furnishings, machines, finished surfaces, and the like which may be damaged by water due to construction operations, and by the misuse of such temporary water service. At completion of the work remove all temporary water distribution items.

1.06 RESTROOM FACILITIES

A. The Contractor shall be permitted to utilize the Owner's restroom facilities in lieu of providing temporary toilets. The Contractor shall exercise reasonable care so as not cause excess soiling or damage to the restroom facilities.

B. Any Contractor abuse of the Owner's restrooms shall be just cause for the Owner to revoke the use of the restrooms for the duration of the Project.

1.07 TEMPORARY STORAGE

A. The Prime Contractor and each of their Sub-Contractors shall be responsible for their own temporary storage.

B. Provide secure areas as may be required for storage and protection of materials, tools and equipment.

1.08 SIGNS

A. Identification Signs: No signs or advertisements shall be permitted on the project site or on temporary structures, except those which are required to conform to the safety requirements of the Contract Documents or those which are expressly permitted by the Architect/Engineer or specified herein.

1.09 SITE SECURITY

A. All temporary construction which may be required to maintain security of buildings or construction areas shall be provided by the Prime Contractor. At the end of each day's work, close all windows opened by construction personnel, and close all access doors to work areas. Work damaged in this regard shall be repaired or replaced to the satisfaction of the Architect/Engineer/Owner. Security guard service shall not be provided as a part of any Contract for this project for field office, storage sheds and storage areas, or for protection of construction tools, equipment, and materials. Such security may, at the Contractor's option, be provided at no additional cost to the Owner.

1.10 TRASH REMOVAL

A. The Prime Contractor shall remove from the Construction site, and legally dispose of, all rubbish resulting from the work under his contract. Rubbish shall be removed daily and not be allowed to accumulate, other than the trash placed in trash containers outside the building.

1.11 RESTORATION OF TEMPORARY FACILITIES

A. The Prime Contractor shall be responsible for his restoration of his own temporary facilities.

B. Storage area and project offices: At completion of the work, remove from the project site all evidence of temporary services, field office, temporary sheds, covers, pallets, excess materials, scrap materials, equipment tools, waste, debris, and other foreign materials. Restore to the Architect/Engineer's satisfaction such area to its condition which existed prior to starting construction work, utilizing whatever methods are appropriate. Repair and patch to match all drive and parking lot surfaces damaged by construction processes; subject to the Architect/Engineer's approval. Fill, grade and reseed all lawn areas and replace all trees, plants or shrubs damaged by the construction process.

1.12 TEMPORARY CONSTRUCTION AREA ENCLOSURES/BARRIERS

A. The Prime Contractor shall provide all temporary enclosures required to secure the worksite.

B. Adequately supported plastic snow fence is acceptable

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 50 10

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PART 1 – GENERAL

1.01 MATERIALS HANDLING

A. Delivery: Deliver materials and equipment to Project Site in unopened, undamaged dry containers, wrappings, cartons, crates, sacks, or the like, clearly labeled as to product and materials, and with the manufacturer's name or trademark or both. Materials delivered in other than such condition may be rejected by the Architect/Engineer.

B. Storage: Suitably store materials and equipment in designated areas and in accordance with manufacturer's recommendations or in a manner approved by the Architect or both. Store such materials and equipment off the ground, totally protected from ground splash, mud, weather separation, intrusion of foreign materials, and other damage. Do not store materials, equipment, or tools on roofs, unless such materials are to be immediately installed during the current work day, and unless equipment and tools are being integrally used in the work. Do not store volatile materials such as solvents, gasoline, oil, fuels, and the like within the building. Immediately remove paper, rags, etc., which might become soaked with such materials when they must be taken into the building for use in the work. At the end of each work day, remove such "safety cans" of materials to their storage area outside the building. The Contractor shall, upon delivery of material and equipment to the project site, check to ascertain that all materials, parts, accessories, and other incidentals necessary for the installation of such materials and equipment have been delivered and received at the project site, so that no delays are caused in the work due to insufficient quantities of materials or missing parts.

1.02 INSTALLATIONS

A. Materials: Materials and equipment shall be new and undamaged and shall be installed as indicated on the drawings. They shall fit accurately into adjacent work and shall be plumb, level, and true-to-line. All materials and equipment shall be anchored securely and rigidly in place, maintaining alignment with adjacent work. Where installation methods and techniques are not specifically covered by the drawings or the specifications, normal first-class trade practices and manufacturer's instructions and recommendations shall govern, providing that they are approved by the Architect/Engineer.

B. "Not-In-Contract" Items: Materials, equipment, fixtures, devices and other items indicated on the drawings as "Not-In-Contract" or "N.I.C." shall in no way be a part of the Contract. Where such "Not-In-Contract" items are accompanied by an indication to be installed by the Contractor, the Contractor shall receive, store, protect, assemble, install, and connect such items in accordance with the best accepted practices of the trade or trades involved and with the provisions of the Specifications for similar items that are totally part of the Contract. The Contractor shall be responsible for obtaining such specific information for the installation and connection of such items.

C. Reinstalling Existing Items: Where existing materials, equipment, fixtures, devices, and other items are indicated on the drawings to be removed, or received, and reinstalled under the Contract, treat such existing items as if they were new and install such existing items as shown on the drawings, in accordance with the best accepted practices of the trade or trades involved and with provisions of the specifications for similar new items.

1.03 REMOVAL AND RE-INSTALLATION OF EQUIPMENT

A. The Owner is not responsible for the removal or re-installation of equipment necessitated by this work.

B. All electrical disconnects and reconnects of equipment necessitated by this work shall be performed by a licensed bonded Electrical Contractor hired by the Contractor to perform this work. The Owner will assist in locating the power source but will not be responsible for the

actual performance the electrical work.

1.04 ACCESSIBILITY

A. The Contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the contract drawings may be made to allow for better accessibility, but changes of magnitude or which involve extra cost shall not be made without approval.

B. It is the Contractor's responsibility to provide access panels when serviceable parts of his installation are concealed by finished construction, unless access panels are specifically indicated on the Drawings or elsewhere in the Project Manual to be by others. Access panel data shall be submitted with the equipment Shop Drawings.

C. Ample space shall be allowed for removal of all parts that may require replacement or service in the future. The service area is to be indicated on Shop Drawings.

D. The Contractor shall extend all grease fittings to an accessible location.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 60 00

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary of Work: Work by Owner or by separate contractors

B. Section 01 32 00 - Submittals and Substitutions

C. Section 01 60 00 - Materials and Equipment

D. Individual Product Specification Sections:

1. Cutting and patching incidental to work of the section
2. Advance notification to other sections of openings required in work of those sections
3. Limitations on cutting structural members

1.03 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of Project
2. Integrity of weather exposed or moisture resistant element
3. Efficiency, maintenance, or safety of any operational element
4. Visual qualities of sight exposed elements
5. Work of Owner or separate contractor

B. Include in request:

1. Identification of Project
2. Location and description of affected Work
3. Necessity for cutting or alteration
4. Description of proposed Work and Products to be used
5. Alternatives to cutting and patching
6. Effect on work of Owner
7. Date and time work will be executed

PART 2 – PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

PART 3 – EXECUTION

3.01 RESPONSIBILITY

A. Each respective Contractor is responsible for the required cutting and patching to complete his work.

B. Each respective Contractor shall coordinate with the General Contractor and bear all costs associated with cutting and patching.

3.02 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.03 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.04 CUTTING

A. Execute cutting and fitting including excavation and fill to complete the Work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Remove samples of installed work for testing when requested.

E. Provide openings in the Work for penetration of mechanical and electrical work.

F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight-exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.05 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. Restore work with new Products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION 01 73 10

PART 1 – GENERAL

1.01 SUBSTANTIAL COMPLETION SUBMISSIONS

A. Record Drawings and Record Specifications:

1. The Contractor shall provide the final Field Record Drawings and Specifications which have been maintained and updated during the duration of the Project to the Architect/Engineer for review. Submit documents in paper form of each Drawing and Specification Division of the Work.

2. Certifications: The Prime Contractor and Subcontractors shall certify, by endorsement on the Record Drawings and Specifications that each of the revised sheets represents a complete and accurate record of the Work as executed.

B. Operations and Maintenance Data

1. Assemble a manual in electronic PDF format on USB Flash Drive indexed by Division of work Sub indexed by Specification of work, presenting for the Owner's guidance full details for care and maintenance of visible surfaces and of equipment included in the Work for review by the A/E.

a. Include a copy of the reviewed Architect/Engineer submittal and/or shop drawing. The Submittal and/or shop drawing shall be annotated by the Contractor indicating that the comments have been included in the document.

b. Include manufacturer's literature relating to motors and other equipment, catalog cut, parts lists, wiring diagrams, instruction sheets, and other pertinent information which will be useful to the Owner in overall operation and maintenance.

c. Include a list of installers and service representatives with company names and addresses, names of individuals to contact, and telephone numbers.

d. Include manuals called for in other Sections of the Specifications, in this manual.

2. Certifications: The Contractor shall certify, by endorsement of the manual, that the manual is complete and accurate.

3. On Projects where the Owner is the Architect/Engineer, submit to the Owner for review.

C. Warranties

1. Forms:

a. Extended Warranties: Provide a copy of the manufacturer's extended warranty, fill it out completely, sign it, and have it countersigned by the installer and manufacturer if required by the Contract Documents.

b. Manufacturers' Warranties: Manufacturer's warranty modified, when required to comply with requirements of the Contract Documents.

2. Starting Date: The starting date for warranties is the Date of Substantial Completion of the Work.

3. Submittal: At the time of Substantial Completion submit all warranties, including special warranties, required by the Contract Documents to the Architect/Engineer review.

D. Statement of Application

1. Submit Owner prepared fully executed Certificate of Substantial Completion.

E. Service and Maintenance Contracts

1. At the time of Substantial Completion submit executed contracts for extended service or maintenance required by the Contract Documents to the Architect/Engineer for review by the A/E.

2. Extended maintenance proposals where called for in the specification shall be submitted with the proposals for each trade at the time their portion of the work is bid. Furnish copies of the maintenance proposal to the Owner and Architect/Engineer for review prior to award of the subcontract for each portion of work.

1.02 FINAL CLEANING

A. Responsibility: The Prime Contractor is responsible for the final cleaning of the Project and for the coordination and direction of cleaning by all trades.

B. Materials:

1. Use only cleaning materials recommended by the manufacturers of the surfaces to be cleaned.

2. Use cleaning materials only on surfaces recommended by the cleaning materials manufacturers.

C. Execution:

1. Employ experienced workers, or professional cleaners, for final cleaning.

2. Clean all surfaces whether exposed to view or not.

3. Remove trash, rubbish, waste materials, tools, and equipment from the site.

4. Remove grease, dust, dirt, plaster, mortar, fingerprints, and other foreign materials from interior and exterior surfaces exposed to view, e.g., the surfaces of structural steel, miscellaneous metal, woodwork, plaster, masonry, concrete, mechanical and electrical equipment, piping, duct work, and conduit; polish surfaces so designated to shine finish.

5. Clean the electrical closets, pipe and duct shafts, chases, furred spaces, and similar spaces which are generally unfinished. Leave these spaces free from rubbish, loose plaster, mortar droppings, waste construction materials, dirt, and dust.

6. The Architect/Engineer is to review items which the Prime Contractor proposes removing labels before they are removed.

7. Maintain cleaning until date of Substantial Completion or the date of partial occupancy of the building, whichever is earlier. Re-cleaning will not be required after the Work has been inspected and accepted, unless later operations of the Contractor make re-cleaning of certain portions necessary.

1.03 PREPARATION OF FINAL RECORD DRAWINGS AND RECORD SPECIFICATIONS

A. The Prime Contractor shall employ the Project A/E to re-draft, in CAD format, the paper copy Record Drawings onto the Bid Drawings to create the final Record Drawings.

B. The Prime Contractor shall employ the Project A/E to retype the paper Record Specifications to indicate all revisions to the Bid Specifications. Items changed shall be marked by a double strike through and revised language inserted in red letters.

C. An Allowance to cover the costs of the re-drafting of Drawings and revisions to the Specification will be provided and shall be included in the Prime Contractors Bid. Final Allowance cost payments will be based on actual documented A/E costs for their work. The Allowance payment will be adjusted accordingly. This Allowance shall be listed as a separate line item on the Schedule of Values.

1.04 FINAL CLOSEOUT

A. Final Closeout date shall be as listed in Section 00 10 10 1.01

B. At Final Closeout the Contractor shall submit to the Owner, via the Architect/Engineer if applicable:

1. One (1) hard copy of the reviewed and accepted O&M Manual in 3-ring binder(s)
2. One (1) copy on a USB Flash Drive of the complete Project Documentation in PDF format, except as noted in item “o” below, including but not limited to:
    a. Design Meeting Notes (the Contractor shall coordinate with the A/E to obtain)
    b. Pre-Bid meeting documents
    c. The Contractor’s Project Bidding Documents including Addenda.
    d. Award documentation
    e. Required submissions as detailed in the Award Letter
    f. Pre-Construction meeting documents and
    g. Progress meeting notes and Construction observation notes.
    h. All Change items, e.g. ASI, RFI, RFQ, CP, CO, etc., with documentation
    i. Pay Applications
    j. Reviewed and accepted O&M Manual,
    k. Warranties,
    l. Extended Service and Maintenance Contracts
    m. Record Specifications
    n. A scanned copy of the marked-up Record Drawings
    o. Record Drawings in both PDF and CAD format
3. The Prime Contractor shall retain the paper copies of the Record Drawings and Record Specifications for a minimum of seven (7) years in a safe location and produce these documents upon request by the Owner.

PART 2 – NOT USED

PART 3 – NOT USED

END OF SECTION 01 77 00

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METAL STUDS FOR INTERIOR WALLS

PART 1 – GENERAL

1.01 PRODUCT HANDLING

A. Protection: Use all means necessary to protect metal studs before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 METAL STUDS

A. Standards: All metal studs and accessories shall meet or exceed the minimum requirements of Federal Specifications QQS-698 and QQS-775d, class d, for the items and use intended.

B. Materials:

1. All metal studs and accessories, unless otherwise specifically approved by the Architects, shall be galvanized steel.
2. Studs and runners shall be channel-type, roll-formed 20 gauge (standard) size.
3. All furring channels shall be 25 gauge.
4. Steel runners and hangers shall be sizes as indicated on the Drawings.
5. Bridging requirements are to be designed by the supplier. Maximum spacing of bridging is to be 5'-0" o.c. All bridging is to be attached with gauge angles and screws. Minimum attachment to be 18 gauge short angle and (4) TEK screws.

2.02 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of metal studs, shall be new, first quality of their respective kinds, in strict accordance with the recommendations of the manufacturer of the metal studs used, and subject to approval of the Architect/Engineer.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that metal studs may be installed in strict accordance with the original design and the manufacturer's recommendations.

3.02 INSTALLATION

A. Erect framing and panels plumb, level and square in strict accordance with the approved shop drawings.

B. Handling and lifting of prefabricated panels shall be done in a manner which will not cause distortion in any manner.

C. Track shall be securely anchored to the supporting structure as shown on erection drawings. Concrete anchors shall be installed after full compressive strength has been achieved.

D. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt-welded or spliced together.

E. Studs shall be plumb, aligned and securely attached to the flange or webs of both upper and lower tracks.

F. Jack studs or cripples shall be installed below window sills, above window and door heads, at free standing stair rails and elsewhere to furnish support, and shall be securely attached to supporting members.

G. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the manufacturer's recommendations.

H. Framed wall openings shall include headers and supporting studs as shown on the plans.

I. Temporary bracing shall be provided until erection is complete.

J. Provisions for structure vertical movement shall be provided at the top of each panel section and where indicated on the plans using a vertical slide clip or other means in accordance with the manufacturer's recommendations. Allow for a minimum of 1/2" structure deflection.

K. Provide double studs at wall openings, door and window jambs and not more than 1 1/2" each side of openings and wall intersections.

L. Coordinate erection of studs with requirements of door frame supports and attachments.

END OF SECTION 05 41 00

PART 1 – GENERAL

1.01 DESCRIPTION

A. Section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.02 RELATED WORK

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY AND MILLWORK.

B. Gypsum sheathing: Section 09 25 00, GYPSUM BOARD SYSTEM.

1.03 SUMBITTALS

A. Submit in accordance with Section 01 32 00, SAMPLES AND SHOP DRAWINGS.

B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 6 inches above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.05 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA):

1. National Design Specification for Wood Construction WCD Number 1-01 Conventional Wood Frame Construction

C. American Institute of Timber Construction (AITC):

1. A190.1-92 Structural Glued Laminated Timber

D. American Society of Mechanical Engineers (ASME):

1. B18.2.1A-99 Square and Hex Bolts and Screws

2. B18.2.2-87 (R99) Square and Hex Nuts

3. B18.6.1-81 (R97) Wood Screws

4. B18.6.4-98 Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

E. American Plywood Association (APA):

1. E30-1996 Design/Construction Guide - Residential and Commercial

F. American Society for Testing And Materials (ASTM):

1. A47-99 Ferritic Malleable Iron Castings

2. A48-00 Gray Iron Castings

3. A653/A653M-00 Steel Sheet Zinc-Coated (Galvanized) or Zinc- Iron Alloy Coated (Galvannealed) by the Hot Dip Process

4. C954-00 Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch to 0.112-inch in thickness
5. C1002-01 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
6. D143-(R00) Small Clear Specimens of Timber, Method of Testing
7. D1760-01 Pressure Treatment of Timber Products D2559-00 Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
8. D3498-01 Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems F844-00 Washers, Steel, Plan (Flat) Unhardened for General Use
9. F1667-01 Nails, Spikes, and Staples

G. U.S. Department of Commerce Product Standard (PS)

1. PS 1-95 Construction and Industrial Plywood
2. PS 20-70 (R86) American Softwood Lumber Standard
3. PS 58-74 Basic Hardboard

PART 2 – PRODUCTS

2.01 LUMBER

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

4. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
5. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA, National Design Specification for Wood Construction having design stresses as shown.

C. Lumber Other Than Structural:

1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
2. Framing lumber: Minimum extreme fiber stress in bending of 1100.
3. Furring, blocking, nailers and similar items 4 inches and narrower Standard Grade; and, members 6 inches and wider, Number 2 Grade.
4. Board Sub-flooring: Shiplap edge, 1 inch thick, not less than 8 inches wide.

D. Sizes:

1. Conforming to Prod. Std., PS20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:

1. At time of delivery and maintained at the site.
2. Boards and lumber 2 inches and less in thickness: 19 percent or less.
3. Lumber over 2 inches thick: 25 percent or less.

F. Fire Retardant Treatment:

1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.

2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.

2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.

3. Treat other members specified as preservative treated (PT).

4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.02 PLYWOOD

A. Comply with Prod. Std., PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

C. Sheathing:

1. APA rated Exposure 1 or Exterior; panel grade CD or better.

2. Wall sheathing:

a. Minimum 11/32 inch thick with supports 16 inches on center and 15/32 inch thick with supports 24 inches on center unless specified otherwise.

b. Minimum 48 inches wide at corners without corner bracing of framing.

3. Roof sheathing:

a. Minimum 11/32 inch thick with span rating 24/0 or 15/32 inch thick with span rating for supports 16 inches on center unless specified otherwise.

b. Minimum 19/32 inch thick or span rating of 40/20 or 23/32 inch thick or span rating of 48/24 for supports 24 inches on center.

D. Subflooring:

1. Under finish wood flooring or underlayment:

a. APA Rated sheathing, Exposure 1. panel grade CD.

b. Minimum 19/32 inch thick with span rating 32/16 or greater for supports at 16 inches on center and 23/32 inch thick with span rating 48/24 for supports at 24 inches on center.

2. Combination subflooring-underlayment under resilient flooring or carpet:

a. APA Rated Stud-I-Floor Exterior or Exposure 1, T and G.

b. Minimum 19/32 inch thick or greater, span rating 16, for supports at 16 inches on center; 23/32 inch thick or greater, span rating 24, for supports at 24 inches on center.

c. Minimum 3/4-inch thick or greater, span rating 32, for supports at 32 inches on center; 1-1/8 inch thick, span rating 48 for supports at 48 inches on center.

E. Underlayment:

1. APA rated Exposure 1 or Exterior, panel grade C-C Plugged.

2. Minimum 1/4 inch thick or greater over plywood subflooring and 3/8 inch thick or greater over board subflooring, unless otherwise shown.

2.03 STRUCTURAL-USE PANELS

A. Comply with APA.

B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.

C. Wall and Roof Sheathing:

1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 16 inches on center and 24/0 or greater for supports 24 inches on center.

D. Subflooring:

1. Under finish wood flooring or underlayment:

a. APA rated sheathing panels, durability classification of Exposure 1 or Exterior.

b. Span Rating of 24/16 or greater for supports 16 inches on center and 24 or greater for supports 24 inches on center.

2. Under resilient floor or carpet.

a. APA rated combination subfloor-underlayment grade panels, durability classification of Exposure 1 or Exterior T and G.

b. Span Rating of 16 or greater for supports 16 inches on center and 24 or greater for supports 24 inches on center.

E. Underlayment:

1. APA rated Exposure l.

2. Minimum 1/4 inch thick or greater over subfloor.

F. Wood "I" Beam Members:

1. Size and Shape as shown.

2. Cambered and marked "Top up".

3. Plywood webs: PS-1, minimum 3/8 inch thick, unless shown otherwise.

4. Flanges: Kiln dried stress rated dense lumber minimum 1-1/2 inch thick, width as shown.

5. Plywood web fitted into flanges and joined with ASTM D2559 adhesive to form "I" beam section unless shown otherwise.

G. Laminated Veneer Lumber (LVL):

1. Bonded jointed wood veneers with ASTM D2559 adhesive.

2. Scarf jointed wood veneers with grain of wood parallel.

3. Size as shown.

2.04 ROUGH HARDWARE AND ADHESIVES

A. Anchor Bolts:

1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.

2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 1/2 inch bolt unless shown otherwise.

C. Washers

1. ASTM F844.

2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:

1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.

2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.

2. ASTM F1667:

a. Common: Type I, Style 10.

b. Concrete: Type I, Style 11.

c. Barbed: Type I, Style 26.

d. Underlayment: Type I, Style 25.

e. Masonry: Type I, Style 27.

f. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 1-1/4 inches long, 8d and deformed or annular ring shank.

F. Framing and Timber Connectors:

1. Fabricate of ASTM A446, Grade A; steel sheet not less than 0.052 inch thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.

2. Framing Angles: Angle designed with bendable legs to provide three way anchors.

3. Straps:

a. Designed to provide wind and seismic ties with sizes as shown or specified.

b. Strap ties not less than 1-1/4 inches wide.

c. Punched for fastener.

4. Metal Bridging:

a. Optional to wood bridging.

b. V shape deformed strap with not less than 2 nail holes at ends, designed to nail to top and side of framing member and bottom and side of opposite member.

c. Not less than 3/4 by 5 inches bendable nailing flange on ends.

d. Fabricated of 0.04 inch minimum thick sheet.

5. Joist Hangers:

a. Fabricated of 0.063 inch minimum thick sheet, U design unless shown otherwise.

b. Heavy duty hangers fabricated of minimum 0.108 inch thick sheet, U design with bent top flange to lap over beam.

6. Timber Connectors: Fabricated of steel to shapes shown.

7. Joist Ties: Mild steel flats, 3/16 by 1-1/4 inch size with ends bent about 30 degrees from horizontal, and extending at least 16 inches onto framing. Punch each end for three spikes.

8. Wall Anchors for Joists and Rafters:

a. Mild steel strap, 3/16 by 1-1/4 inch with wall ends bent 2 inches, or provide 3/8 by 5 inch pin through strap end built into masonry.

b. Strap long enough to extend onto three joists or rafters, and punched for spiking at each bearing.

c. Strap not less than 4 inches embedded end.

9. Joint Plates:

a. Steel plate punched for nails.

b. Steel plates formed with teeth or prongs for mechanically clamping plates to wood.

c. Size for axial eccentricity, and fastener loads.

G. Adhesives:

1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.

2. For structural laminated Wood: ASTM D2559.

PART 3 – EXECUTION

3.01 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS

A. General:

1. Set rough carpentry to required levels and lines with members plumb, true to line, cut, and fitted.

2. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit.

3. Locate furring, nailers, blocking, grounds and similar supports to comply with requirements for attaching other construction.

B. Conform to applicable requirements of the following:

1. AFPA National Design Specification for Wood Construction for timber connectors.

2. AITC Timber Construction Manual for heavy timber construction.

3. AFPA WCD-number 1, Manual for House Framing for nailing and framing unless specified otherwise.

4. APA for installation of plywood or structural use panels.

5. ASTM F 499 for wood underlayment.

6. TPI for metal plate connected wood trusses.

C. Apply field treatment complying with AWPA to cut surfaces of preservative-treated lumber and plywood.

3.02 FASTNERS

A. Nails.

1. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.

a. For sheathing and subflooring, select length of nails sufficient to extend 1 inch into supports.

b. Use eight penny or larger nails for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber.

c. Use 16 penny or larger nails for nailing through 2 inch thick lumber.

B. Bolts:

1. Fit bolt heads and nuts bearing on wood with washers.

2. Countersink bolt heads flush with the surface of nailers.

3. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.

4. Use toggle bolts to hollow masonry or sheet metal.

5. Use bolts to steel over 0.112 inch, 11 gage in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 24 inch intervals between end bolts. Use clips to beam flanges.

C. Drill Screws to steel less than 0.112 inch thick.

1. ASTM C1002 for steel less than 0.033 inch thick.

2. ASTM C 954 for steel over 0.033 inch thick.

D. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.

E. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.

F. Screws to Join Wood:

1. Where shown or option to nails.

2. ASTM C1002, sized to provide not less than 1 inch penetration into anchorage member.

3. Spaced same as nails.

3.03 INSTALLATION PROCEDURES

A. Installation of Timber Connectors:

1. Conform to applicable requirements of the NFPA National Design Specification for Wood Construction.

2. Fit wood to connectors and drill holes for fasteners so wood is not split.

B. Set sills or plates level in full bed of mortar on masonry or concrete walls.

1. Space anchor bolts 4 feet on centers between ends and within 6 inches of end. Stagger bolts from side to side on plates over 7 inches in width.

2. Use shims of slate, tile or similar approved material to level wood members resting on concrete or masonry. Do not use wood shims or wedges.
3. Closely fit, and set to required lines.

C. Cut notch, or bore in accordance with NFPA Manual for House-Framing for passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

D. Blocking Nailers, and Furring:

1. Install furring, blocking, nailers, and grounds where shown.
2. Use longest lengths practicable.
3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking or Plates:
   a. Stagger end joints between upper and lower pieces.
   b. Nail at ends and not over 24 inches between ends.
   c. Stagger nails from side to side of wood member over 5 inches in width.

E. Floor and Ceiling Framing:

1. Set with crown edge up.
2. Bear on not less than 4 inches on concrete and masonry, and 1-1/2 inches on wood and metal unless shown otherwise.
3. Support joist, trimmer joists, headers, and beams framing into carrying members at same relative levels on joist hangers unless shown otherwise.
4. Lap and spike wood joists together at bearing, or butt end-to-end with scab ties at joint and spike to plates. Scab tie lengths not less than 8 inches lap on joist ends. Install wood I beam joists as shown.
5. Frame openings with headers and trimmer joist. Double headers carrying more than two tail joists and trimmer joists supporting headers carrying more than one tail joist unless otherwise shown.
6. Drive nails through headers into joists using two nails for 2 inch by 6 inch; three nails for 2 inch by 8 inch and four nails for 2 inch by 10 inch and over in size.
7. Install nearest joist to double headers and spike joist to both header members before trimmer joist is installed and secured together.
8. Doubled joists under partitions parallel with floor joists.
9. Where joists run perpendicular to masonry or concrete, anchor every third joist to masonry or concrete with one metal wall anchor. Securely spike anchors with three nails to side of joist near its bottom.
10. Anchor joists running parallel with masonry or concrete walls to walls with steel flats spaced not over 6 feet apart. Extend steel flats over at least three joists and into masonry 4 inches with ends turned 2 inches; bolt to concrete. Set top of flats flush with top of joists, and securely nail steel flats to each joist.
11. Hook ties at steel framing over top flange of steel members.
12. Nonbearing partitions running parallel with ceiling joists, install solid 2 inch thick bridging same depth as ceiling joists cut to fit snug between joists for securing top plate of partitions. Securely spike bridging to joists. Space 4 feet on center.

13. Where ceramic tile finish floors are set in Portland cement mortar, nail continuous 2 inches by 3 inches ledgers to sides of joists to support subflooring flush with top of joist.

F. Bridging:

1. Use 1 inch by 3 inch lumber with ends beveled for slope. Option: Metal bridging may be used for wood bridging.
2. Install one row of bridging for joist spans over 8 feet, but less than 16 feet long; install two rows for spans over 16 feet long.
3. Install an extra row of bridging between trimmer and next two joists if header is more than 2 feet from end of trimmer or from regular row of bridging.
4. Secure with two nails at ends.
5. Leave bottom ends loose until after subflooring or roof sheathing is installed.
6. Install single row of bridging at centerline of span and two rows at the third points of span unless otherwise shown.

G. Roof Framing:

1. Set rafters with crown edge up.
2. Form a true plane at tops of rafters.
3. Valley, Ridge, and Hip Members:
   a. Size for depth of cut on rafters.
   b. Straight and true intersections of roof planes.
   c. Secure hip and valley rafters to wall plates by using framing connectors.
   d. Double valley rafters longer than the available lumber, with pieces lapped not less than 4 feet and spiked together.
   e. Butt joint and scab hip rafters longer than the available lumber.
4. Spike to wall plate and to ceiling joists except when secured with framing connectors.
5. Frame openings in roof with headers and trimmer rafters. Double headers carrying more than one rafter unless shown otherwise.
6. Install 2 inch by 4 inch strut between roof rafters and ceiling joists at 4 feet on center unless shown otherwise.

H. Partition and Wall Framing:

1. Use 2 inch by 4 inch studs spaced 16 inches on centers; unless shown otherwise.
2. Install double studs at openings and triple studs at corners.
3. Installation of sole plate:
   a. Anchor plates of walls or partitions resting on concrete floors in place with expansion bolts, one near ends of piece and at intermediate intervals of not more than 4 feet or with power actuated drive pins with threaded ends of suitable type and size, spaced 2 feet on center unless shown otherwise.
   b. Nail plates to wood framing through subfloor as specified in nailing schedule.
4. Headers or Lintels:
   a. Make headers for openings of two pieces of 2 inch thick lumber of size shown with plywood filler to finish flush with face of studs or solid lumber of equivalent size.

b. Support ends of headers on top of stud cut for height of opening. Spike cut stud to adjacent stud. Spike adjacent stud to header.

5. Use double top plates, with members lapped at least 2-feet spiked together.
6. Install intermediate cut studs over headers and under sills to maintain uniformity of stud spacing.
7. Use single sill plates at bottom of opening unless shown otherwise. Toe nail to end stud, face nail to intermediate studs.
8. Install 2 inch blocking for firestopping so that maximum dimension of any concealed space is not over 8 feet in accordance with NFPA Manual for House Framing.
9. Install corner bracing when plywood or structured use panel sheathing is not used.
   a. Let corner bracing into exterior surfaces of studs at an angle of approximately 45 degrees, extended completely over walls plates, and secured at bearing with two nails.
   b. Use 1 inch by 4 inch corner bracing.

I. Rough Bucks:

1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.
2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.
3. Cut rough bucks from 2 inch thick stock, of same width as partitions in which they occur and of width shown in exterior walls.
4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.

J. Subflooring:

1. Subflooring may be either boards, structural-use panels, or plywood.
2. Lay board subflooring diagonally, with close joints. Stagger end joints and make joints over supports. Bear each board on at least three supports.
3. Provide a clearance of approximately 1/2 inch at masonry or concrete at walls.
4. Apply plywood and structural-use panel subflooring with face grain or long dimension at right angles to the supports, with edges 1/4 inch apart at side joints, and 1/8 inch apart at end joints.
5. Combination subfloor-underlayment:
   a. A clearance of 1/4 inch at masonry on concrete at walls.
   b. Stagger panel end joints and make over support.

K. Underlayment:

1. Where finish flooring of different thickness is used in adjoining areas, use underlayment of thickness required to bring finish flooring surfaces into same plane.
2. Apply to dry, level, securely nailed, clean, wood subfloor without any projections.
3. Fasten to subfloor as specified in ASTM F499.
4. Plywood and particle underlayment may be glue-nailed to subfloor.

5. Butt underlayment panels to a light contact with a 1/32 inch space between plywood or hardboard underlayment panels and walls, and approximately 3/8 inch between particleboard underlayment panels and walls.
6. Stagger underlayment panel end joints with respect to each other and offset joints with respect to joints in the subfloor at least 2 inches.
7. After installation, avoid traffic on underlayment and damage to its finish surface.

L. Sheathing:

1. Use plywood or structural-use panels for sheathing.
2. Lay panels with joints staggered, with edge and ends 1/8 inch apart and nailed over bearings as specified.
3. Set nails not less than 3/8 inch from edges.
4. Install 2 inch by 4 inch blocking spiked between joists, rafters and studs to support edge or end joints of panels.
5. Match and align sheathing which is an extension of work in place to existing.

END OF SECTION 06 10 00

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PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all labor, materials and equipment necessary to install finish carpentry required to satisfy the intent of the Contract Documents. This work shall include, but is not necessarily limited to, the following;

1. Door Casings
2. Window Frames
3. Trim

1.02 INDUSTRY STANDARDS

A. Publications of the following institutions, associations, societies and agencies are referred to in this section.

1. Architectural Woodwork Institute, "Quality Standards Illustrated", AWI-QSI
2. National Electric Manufacturers Association, NEMA.
3. National Forest Products Association, NFPA.

1.03 QUALITY ASSURANCE

A. Except as otherwise specified, the QUALITY STANDARDS of the Architectural Woodwork Institute, AWI-QSI, shall apply and by reference are hereby made a part of this specification. Any reference to Premium, Custom or Economy in this specification shall be as defined in the latest edition of the AWI-QSI.

1.04 SUBMITTALS

A. Submit samples of all exposed lumber and plywood which is to receive transparent finish.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Immediately upon delivery to job site, place materials in are protected from weather.

B. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation

C. Do not store or install seasoned materials in wet or damp portions of building.

PART 2 – PRODUCTS

2.01 MATERIALS – INTERIOR

A. Exposed lumber: Premium grade to match existing in accordance with AWI-QSI.

B. Concealed lumber: Economy grade softwood in accordance with AWI-QSI.

C. Finish per Section 09 90 10 and/or 09 91 23, Painting and Finishing.

2.02 FABRICATION

A. Fabrication of all finish carpentry items using premium grade materials shall be premium grade and items using custom grade materials shall be custom grade in accordance with AWI-QSI.

B. All exposed wood and plywood items shall be sanded and ready to be finished in the field.

C. All corners at trim and base shall be mitered.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation shall be by trained and thoroughly experienced mechanics.

1. Work shall be set level and plumb. All joints where possible, shall be factory made. Where sections are too large to permit factory-made and factory-glued joints, same shall be cleated and bolted from behind, or held with patented metal fasteners. All joints shall be neat, clean and permanently held.

2. Fastenings shall be concealed wherever possible. Where nails are necessary, they shall be as small as practicable and countersunk for puttying. Nailing shall be in accordance with the nailing recommendations in NFPA "Manual for House Framing".

END OF SECTION 06 20 00

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all materials, labor, and equipment necessary to install fibrous insulation as required by the intent of the Contract Documents.

1.02 PRODUCT DELIVERY AND STORAGE

A. Containers shall be factory marked to identify material, type, grade, and manufacturer.

B. Protect the materials of this Section from exposure to the elements. Do not store on the ground.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Fibrous Insulation
   1. Material: Fiberglass
   2. Type: Batt or rolls - foil or reinforced paper faced vapor barrier on all exterior planes.
   3. Thickness: Shall be equal to the nominal thickness of the cavity in which it is placed, unless noted otherwise in the Contract Documents
   4. Standards: Federal Specification HH-I-521F & ASTM C665.

B. Fibrous Insulation
   1. Material: Mineral Fiber
   2. Type: Batt-creased, unfaced, 3.0 pcf
   3. Thickness: 3"

C. Standards:
   1. Thermafiber SAFB by USG Acoustical Products Company and Pyro-Fiber Sound Control Blanket by Johns Manville Company

PART 3 – EXECUTION

3.01 INSPECTION

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. In the event of a discrepancy, immediately notify the Architect. Do not proceed with the installation until all discrepancies have been resolved.

3.02 INSTALLATION

A. Install insulation in continuous unbroken plane as indicated on the drawings.

B. Lap and seal all joints between batts or rolls and at ends of rolls or batts.

C. Stuff all holes, cracks or recesses with insulation.

D. Fit insulation tightly around all penetrations (pipes, conduits, joists, etc.) of the insulation plane.

E. For vertical installation, staple, glue, or wire insulation in place.

F. Except as otherwise specifically directed by the Architect, install all insulation in accordance with the manufacturer's recommendations.

G. Kraft faced vapor barriers shall not be installed within any wall of fire-rated construction.

END OF SECTION 07 21 16

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PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included:

1. The purpose of sealant in this work is to provide a positive barrier against penetration of moisture at joints between items where sealant is essential to the continued integrity of the barrier.

2. Such sealant may be performed under the work of various sections of these specifications, but must be performed in strict accordance with the provisions of this section.

B. Related Work Specified Elsewhere:

1. Section 09 26 00 Acoustical Treatment for Partitions/Ceilings

1.02 PRODUCT HANDLING

A. Use all means necessary to protect sealant materials before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

C. Storage:

1. Store all sealant materials and equipment under conditions recommended by its manufacturer.

2. Do not use materials stored for a period of time exceeding the maximum recommended shelf-life of the material.

1.03 SUBMITTALS

A. Submit product literature to the Architect in accordance with Section 01 32 00 of these specifications.

PART 2 – PRODUCTS

2.01 MATERIALS

A. All sealant materials, unless otherwise specifically approved by the Architect, shall be single or double component, non-sagging type in neutral color or other color as approved by the Architect where exposed to view.

B. Sealants:

1. Acrylic Latex: One-part, gun-grade, nearly 100 percent recover from 100 percent elongation, excellent paintability, service temperature range zero to +180 degrees fahrenheit (such as Sonneborn Sonolac)

2. Urethane: Two part, gun-grade, such as Sonneborn Sonolastic NP-2

3. Silicone (exterior and interior): One part, gun-grade, such as Sonneborn Sonolastic Omniseal

4. Silicone (interior at areas where moisture is present): One part, gun-grade, mildew and fungus resistant, such as Sonneborn Sololastic Omniplus

5. Polyurethane: One part pourable, such as Sonneborn Sonolastic SL1

6. Polysulfide: Two-part gun grade; ANSI A116.1 and Thiokol Building-Trade Performance Specification (such as Sonneborne Sonolastic Two-Part)

C. Primers: Quick-drying, clear, as recommended by the sealant manufacturer.

D. Backer Rods: Closed-cell polyethylene or urethane foam, polyvinyl chloride, or closed-cell neoprene; circular in cross section and of sizes to assure that they will stay in place under pressure of applying sealants.

2.02 EQUIPMENT

A. All sealant equipment shall be only such equipment as is specifically recommended by the manufacturer of the sealant material being installed.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspections:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that sealant may be installed in accordance with the manufacturer's recommendations.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

A. Primers: Where recommended or required by sealant manufacturer, prime joints with brushes that will reach all surfaces of joint. Mask adjacent surfaces that will not be covered with sealant and that are subject to staining or other damage by primers.

B. Backer Rods: Install firmly and evenly in place where indicated or required to depths and contours recommended by sealant manufacturer. Use backer rods for all exterior caulking work.

3.03 SEALANT LOCATIONS

A. Acrylic Latex: Interior work, where exposed to view; use at contacts of counter tops, backsplashes and endsplashes (where moisture is not present) and walls adjacent thereto; interior control joints and periphery joints at doors and windows. (Colors as selected by Architect).

B. Silicone: Interior work, where not exposed to view; for all acoustical caulking, where acoustical drywall abuts floors and ceilings and where penetrations occur in such walls, such as electrical boxes, fire extinguishers, cabinets, etc.

C. Silicone (exterior): One part, construction grade: metal flashings. (Color as selected by Architect).

D. Silicone (interior where moisture is present): At countertops, backsplashes and endsplashes and walls adjacent thereto, and around all plumbing fixtures.

E. Urethane, two-part, gun-grade: Exterior masonry and concrete work (except joints in horizontal concrete slabs); vertical control joints; color as selected by Architect.

F. Polyurethane, one-part pourable: Exterior concrete flatwork.

3.04 APPLICATION

A. Apply sealants with guns or other devices having nozzles of size to allow joints to be completely filled with single bead of material. Use sufficient pressure to drive materials completely and fully into joints so that joints are weathertight and watertight. Point joints at

flush vertical surfaces slightly concaved; point joints at flush horizontal surfaces slightly convexed so that moisture will not "pond" thereon; uniformly smooth and straight, free from wrinkles and sags. Finished installations of acoustical caulking shall maintain indicated STC ratings.

3.05 APPLICATION LIST

A. Specific applications listed hereinafter are to be used as a bidding and application aid and are not intended to necessarily represent all required sealant applications.

1. Exterior and Interior control joints.
2. Periphery joints at exterior steel frames, exterior aluminum frames, interior steel frames, interior aluminum frames, windows, louvers and similar wall penetrations.
3. Plumbing fixture to wall joints.
4. Counter top and counter top backsplash to wall joints.
5. Exterior wall penetrations.
6. Cut stone to cut stone joints and stone to brick joints.
7. Perimeter stone to wall joints.
8. All applications indicated on drawings, other locations standard to the industry and as directed by the Owner.

3.06 COMPLETION OF WORK

A. Remove excess sealants from joints. Remove sealant deposits from surfaces not intended to be caulked and restore such surfaces to their original conditions.

END OF SECTION 07 92 00

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PART 1 – GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, services, equipment and apparatus whether necessary or incidental to complete installation of all hollow metal doors and frames required for the project as shown on the Drawings and specified herein.

B. Non-rated steel doors

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 00 - Bidding and Contract Requirements, including the General Conditions of the Contract

B. Division 01 - General Requirements

C. Section 06 10 00 - Rough Carpentry

D. Section 07 92 00 - Joint Sealants

E. Section 08 14 16 - Flush Wood Doors

F. Section 08 71 00 - Finish Hardware

G. Section 08 81 00 - Glass and Glazing

H. Section 09 21 16 - Gypsum Wallboard Systems

I. Section 09 91 23 - Painting and Finishing

1.03 SITE INSPECTION

A. This Contractor shall visit the site and become thoroughly familiar with all conditions. Refer to Division 1 for site examination requirements and procedures.

1.04 REFERENCE STANDARDS

A. ANSI/S.D.I. 100 - RECOMMENDED SPECIFICATIONS STANDARD STEEL DOORS AND FRAMES, Steel Door Institute.

B. ANSI A115 - STANDARD SPECIFICATION FOR DOOR AND FRAME PREPARATION FOR HARDWARE, American National Standards Institute.

C. Thermal rated assemblies ASTM C236-89 or ASTM C976-90

1.05 SUBMITTALS

A. Manufacturer's written certification that materials meet Specification requirements

B. Submit under provisions of Section 01 32 00

C. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cutouts for glazing, and finish.

D. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.

E. Manufacturer’s installation instructions: indicate special installation instructions.

F. Manufacturer’s certificate: Certify that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Installer: Company specializing in hollow metal door and frame work of comparable scope with a minimum of three (3) years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Accept doors on site in manufacturer’s packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.09 COORDINATION

A. Coordinate the work with door opening construction, door frame and door hardware installation.

PART 2 - PRODUCTS

2.01 MATERIALS - INTERIOR DOORS - GENERAL

A. Sheet Steel: Commercial quality carbon steel, cold-rolled, annealed, and free from scale, pitting, rust or other defects - ASTM A366

1. Gauges:

a. Interior frames - 18 gauge, mitered corners.

b. Interior doors - (Non-rated): SDI-100 Grade II, 18 gauge, heavy duty 1-3/4" (44mm) (Level B),Model 3 - Seamless .

c. Reinforcement for hardware - in accordance with Steel Door Institute Standard (S.D.I.) 100, Table IV.

d. Glass Moldings - 20 gauge.

B. Primer:

1. For non-galvanized steel, primer shall be manufacturer's standard rust-resistant metallic or phenol-resin primer.

2. For galvanized steel, primer shall be zinc dust oxide primer, such as Porter No. 299 Zinc-dust Primer.

3. Air dried.

C. Core Filler Material:

1. Non-insulated doors - manufacturer's standard cardboard honeycomb.

2. Core material shall completely fill the inside of the door and be laminated to both inside faces of the panels.

D. Acceptable manufacturers:

1. Steelcraft of Masco Industries

2. Republic Builders Products

3. Ceco Corporation.

4. Curries of L.B. Foster Co.

5. Fenestra Corporation

6. Emerson Engineering Company, Inc.

PART 3 – EXECUTION

3.01 FABRICATION

A. Frames shall be set up, arc welded and ground smooth and shall have spreaders attached. Provide frame anchors of the proper type for adjoining construction. No less than three (3) wall anchors per jamb or frames to 7'-4" high, four (4) anchors per jamb for frames over 7'-4" high.

B. Doors shall be full flush type, with seams finished so as to be invisible.

1. Close top and bottom edges of door with steel channel, minimum 18 gauge, extending full width of door, and spot welded to both faces.
2. Provide bevel on swing side.
3. Provide adequate bracing.
4. Fabricate doors with hardware reinforcement welded in place.

C. Provide for hardware specified in Section 087100 - Finish Hardware. Provide reinforcing for hardware in accordance with ANSI A115.

D. Provide UL labels of non-rusting metal attached with pop rivets on both doors and frames where indicated. Unless otherwise scheduled, "B label" shall be "1-1/2 hour B label".

E. Provide screw-on glazing stops with mitered corners. Locate stops on non-security side of opening.

F. Finishing:

1. Thoroughly clean all contaminates from surface by washing with clean solvent and wiping with clean cloths.
2. Treat non-galvanized items with phosphate pretreatment.
3. All doors and frames shall receive a factory applied primer.
4. All concealed parts of frames to be installed in masonry walls shall be coated with bituminous paint.

G. Furnish galvanized steel shims as required to maintain 1/8" clearance between frame and door and between pairs of doors.

H. Where indicated, provide inserted type sightproof stationary metal louvers.

I. For openings which are to be equipped with electric door locks, modify standard frame and door construction as is necessary to accommodate the electric locks.

J. Steel sheet: Galvanized to ASTM A525 G60.

3.02 INSTALLATION

A. Anchor work securely to adjacent construction.

B. Set frames accurately, plumb and square. Brace until attached to adjacent construction.

C. Install doors in accordance with ANSI/SDI-100 and DHI.

D. Do not use cardboard or other unspecified material for shims.

E. Install metal doors and frames in accordance with the following standards published by the Steel Door Institute: Frames, SDI 105; Hardware, SDI 107; Doors, SDI 100.

F. Frames installed in existing masonry walls shall be grouted in on both sides to provide a sealed installation. Grout used shall meet rating of the door and frame assembly.

G. Coordinate installation of doors with installation of frames and hardware specified in Section 08 71 00.

3.03 DISPOSAL

A. All waste materials shall be properly and legally recycled or disposed of off the site by the Contractor. Burning on the site will not be allowed.

3.04 EXAMINATION

A. Verify substrate conditions.

B. Verify that opening sizes and tolerances are acceptable. ERECTION TOLERANCES

C. Maximum Diagonal Distortion: 1/16 inch (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust work under provisions of Section 01 77 00.

B. Adjust door for smooth and balanced door movement.

END OF SECTION 08 11 13

ALUMINUM STILE AND RAIL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum stile and rail doors.

B. Door Hardware

1.02 RELATED SECTIONS

A. Section 08 80 00 - Glazing.

1.03 REFERENCES

A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.

D. ASTM E 84 - Surface Burning Characteristics of Building Materials.

E. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

G. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

H. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer’s corresponding standard systems.

B. Air Infiltration: For a single door, test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 psf. Door shall not exceed 0.01 cfm per square foot.

C. Uniform Structural Load: For a single door, test specimen shall be tested in accordance with ASTM E 330. Plus or minus 67.5 pounds per square foot.

D. Water Resistance: For a single door, test specimen shall be tested in accordance with ASTM E 331 at a pressure differential of 3.75 psf. No leakage.

E. Large Missile Impact: Single impact. Pass.

F. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.

1.05 SUBMITTALS

A. Comply with Section 01 32 00 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.

C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, glazing, and finish.

D. Samples:

1. Doors: Submit manufacturer's sample of doors showing stiles, rails, framing, hardware, glazing, and finish.

2. Color: Submit manufacturer's samples of standard colors of doors and frames.

E. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.

F. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.

G. Warranty: Submit manufacturer's standard warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years successful experience.

2. Door and frame components from same manufacturer.

3. Evidence of a compliant documented quality management system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials and finish from damage during handling and installation.

1.07 WARRANTY

A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

B. Warranty Period: Ten years starting on date of shipment.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.

2.02 MONUMENTAL STILE AND RAIL DOORS

A. Model: SL-15 wide stile monumental aluminum stile and rail doors.

B. Door Opening Size: As indicated on the Drawings.

C. Door Thickness: 1-3/4 inches.

D. Stiles and Rails:

1. Material: Aluminum Alloy 6063-T5 tubular extrusions, 0.125-inch minimum wall thickness, 1-piece.

2. Stile Width: 4-1/2 inches.

3. Rail Width:
   a. Top: 6-1/2 inches.
   b. Bottom: 10 inches.

E. Corners:

1. True mortise and tenon joints.

2. Full-width 3/8-inch diameter galvanized steel tie rods secured with locking hex nuts.

F. Welding of Joints: Not permitted.

G. Mid Panel:

1. Model: SL-484.

2. Height: 12 inches.
3. Frame: Aluminum extrusions with extruded spline and interlocking edges to secure face sheets.
4. Core: Poured-in-place urethane, minimum 5 pounds per cubic foot density.
5. Fasten with mortise and tenon joints and two 3/8-inch diameter galvanized steel tie rods with locking hex nuts.
6. Face Sheet:

H. SpecLite3 Fiberglass Reinforced Polyester (FRP) to match doors.

2.03 MATERIALS

A. Aluminum Members:

1. Extrusions: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Wall Thickness: 0.125 inch.
4. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.

B. Fasteners:

1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
2. Compatibility: Compatible with items to be fastened.
3. Exposed Fasteners: Oval Phillips head screws with finish matching items to be fastened.

2.04 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units and profile requirements shall be as indicated on the Drawings.

B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.

C. Assembly:

1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
2. Remove burrs from cut edges.

D. Welding: Welding of doors or frames is not acceptable.

E. Fit:

1. Maintain continuity of line and accurate relation of planes and angles.
2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.05 ALUMINUM DOOR FRAMING SYSTEMS

A. Tubular Framing:

1. Size and Type: SL450T 2” x 4-1/2” as indicated on the Drawings.
2. Materials: Aluminum Alloy 6063-T5, 0.125-inch minimum wall thickness.
3. Applied Door Stops: 0.625-inch high, with screws and weatherstripping. Door stop shall incorporate pressure gasketing for weathering seal. Counterpunch fastener holes in door stop to preserve full metal thickness under fastener head.
4. Frame Members: Box type with 4 enclosed sides. Open-back framing is not acceptable.
5. Caulking: Caulk joints before assembling frame members.

6. Joints:
   a. Secure joints with fasteners.
   b. Provide hairline butt joint appearance.
7. Field Fabrication: Field fabrication of framing using stick material is not acceptable.
8. Applied Stops: For side, transom, and borrowed lites and panels. Applied stops shall incorporate pressure gasketing for weathering seal. Reinforce with solid bar stock fill for frame hardware attachments.
9. Hardware:
   a. Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and hardware schedule.
   b. Factory install hardware.(except closers)
10. Anchors:
    a. Anchors appropriate for wall conditions to anchor framing to wall materials.

B. Door jamb and header mounting holes shall be spaced no more than 24 inches apart.

C. Secure head and sill members of transom, side lites, and similar conditions.

1. Side Lites:
   a. Factory preassemble side lites to greatest extent possible.
   b. Mark frame assemblies according to location.

D. HARDWARE

1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
2. All Hardware to be supplied and installed by door manufacture. Except as noted)

E. Hardware Schedule: As follows.

1. Hinges: SL-11HD DB continuous hinges.
2. Locking Hardware: Von Duprin 99 Series.
3. Lock-Down end cap: Trimco LDH-100 on all applicable dogging devices to replace existing end cap.
4. Door Pulls: SL-84.
5. Cylinders: Best interchangeable core cylinders, cores by owner.
6. Mullions: SL-60EK. At pair of doors.
7. Closers: LCN 4040 XP of LCN 4642 on ADA automatic doors
8. Threshold: NGP 425
9. Sweeps: NGP D608DKB (field install exterior doors only)

F. Finish: Dark Bronze

2.06 GLAZING

A. Factory Glazing of doors: 1/4-inch glass at interior locations, 1-inch glass insulating units at exterior.

B. Design glazing system for replacement of glass.

C. Manufacturer’s standard flush glazing system of recessed channels and captive glazing gaskets or applied stops as indicated on the Drawings.

D. Allow for thermal expansion on exterior units.

2.07 ALUMINUM FINISHES

A. Anodized Finish: Class I finish, 0.7 mils thick.

1. Dark Bronze, AA-M10C12C22A44.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.03 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Install doors plumb, level, square, true to line, and without warp or rack.

C. Anchor frames securely in place.

D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.

E. Set thresholds in bed of mastic and backseal.

F. Install exterior doors to be weathertight in closed position.

G. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

H. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

3.05 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.06 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.07 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 11 16

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PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Non-rated steel doors.

B. Rated steel doors

1.02 REFERENCES

A. ANSI A117.1 - Specifications for making buildings and facilities accessible to and usable by physically handicapped people.

B. ANSI/SDI-100 Standard steel doors and frames.

C. ASTM A525 - Steel Sheet, Zinc-coated (galvanized) by the hot-dip process.

D. ASTM E152 - methods of fire tests or door assemblies.

E. Door hardware institute (DHI) - The installation of Commercial Steel Doors and steel frames, insulated Steel doors in wood frames and builder's hardware.

F. NFPA 80 - Fire Doors and Windows.

G. NFPA 252 - Fire Tests for Door Assemblies.

H. UL 10B - Fire Tests of Door Assemblies.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 32 00.

B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, and finish.

C. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.

D. Manufacturer's installation instructions: indicate special installation instructions.

E. Manufacturer's certificate: Certify that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

A. Fire Rated Door Construction: Conform to ASTM E152, NFPA 252, UL 10B.

B. Fire Rated Door Construction: Rate of rise of 450 F degrees (250 C degrees) across door thickness.

C. Installed Door Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.09 COORDINATION

A. Coordinate the work with door opening construction, door frame and door hardware installation.

PART 2 – PRODUCTS

2.01 DOOR MANUFACTURERS

A. Ceco Corporation

B. Curries Manufacturing, Inc.

C. Fenestra Corporation

D. Steelcraft/Div. American Standard Co.

E. Republic Builders Products Corp.

F. Emerson Engineering Company, Inc.

2.02 DOORS

A. Interior Doors:

1. Grade II - Heavy Duty 1-3/4 inches (44mm) (Level B):

2. Model 3 - Seamless - Hollow Steel Construction

B. Exterior Doors:

1. Grade III - Extra heavy-duty 1-3/4 inches (44mm) (Level A):

2. Model 3 - Seamless - Hollow Steel Construction

C. Exterior Doors (Thermally Broken): SDI-100 Grade II Model 1: 16 ga. galvanized steel sheet faces.

D. Interior Doors: (Non-rated): SDI-100 Grade II. 18 ga. sheet faces.

E. Interior Doors: (Fire-rated): SDI-100 Grade II. 18 ga. sheet faces.

2.03 DOOR CONSTRUCTION

A. Face: Steel sheet in accordance with ANSI/SDI-100.

B. Core: Cardboard honeycomb.

C. Thermal Insulated Door: Total insulation R value of 4 (RSI, measure in accordance with ASTM C236.

2.04 ACCESSORIES

A. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.

B. Primer: Zinc chromate type.

2.05 FABRICATION

A. Astragals for Double Doors: Steel Z shaped, specifically for double doors.

B. Fabracate doors with hardware reinforcement welded in place.

C. Attach fire rated label to each door unit.

D. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.

E. Configure exterior doors with special profile to receive recessed weatherstripping.

F. All exterior doors to be galvanized (G60).

2.06 FINISH

A. Steel sheet: Galvanized to ASTM A525 G60.

B. Primer: Air dried.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify substrate conditions.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

A. Install doors in accordance with ANSI/SDI-100 and DHI.

B. Coordinate installation of glass and glazing.

C. Coordinate installation of doors with installation of frames and hardware specified in Section 08 71 00 and Section 08 71 01.

D. U.L. Labels are to be of non-rusting metal attached with pop rivets. Do not paint over label.

3.03 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch (1.5 mm) measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 77 00.

B. Adjust door for smooth and balanced door movement.

END OF SECTION 08 13 13

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PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Aluminum doors, windows and frames.

B. Vision glass.

C. Door hardware.

D. Perimeter sealant.

1.02 REFERENCES

A. AA (Aluminum Association)- Designation System for Aluminum Finishes.

B. AAMA- Metal Curtain Wall, Window, Store Front and Entrance-Guide Specification Manual.

C. AAMA- Curtain Wall Manual #10 -Care and Handling of Architectural Aluminum From Shop to Site.

D. AAMA 501.2- Methods of Test For Metal Curtain Walls.

E. AAMA 603.8- Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.

F. AAMA 605.2- Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

G. AAMA 606.1- Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.

H. AAMA 607.1- Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

I. AAMA 608.1- Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

J. AAMA FC-1 - Field check of metal curtain walls for water leakage.

K. AAMA SFM-1 - Aluminum Storefront and Entrance Manual.

L. ANSI A117.1 - Safety Standards for the Handicapped.

M. ASCE 788 - Calculation of Wind Loads.

N. ASTM A36/A36M - Structural Steel.

O. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

P. ASTM A446/A446M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

Q. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

R. ASTM B209M- Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

S. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

T. ASTM B221M- Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube (Metric).

U. ASTM E283- Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.

V. ASTM E330- Structural Performance of Exterior Windows, CurtainWalls, and Doors by Uniform Static Air Pressure Difference.

W. ASTM E331- Test Method for Water Penetration of Exterior Windows, CurtainWalls, and and Doors by Uniform Static Air Pressure Difference.

X. ASTM E1105- Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.

Y. SSPC (Steel Structures Painting Council) - Paint 20 Zinc Rich Coating.

Z. SSPC (Steel Structures Paining Council)- Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments).

1.03 SYSTEM DESCRIPTION

A. Aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory finished, vision glass, glass insulated metal panel infill, related flashings, anchorage and attachment devices.

B. Exterior windows include tubular aluminum sections thermally broken, shop fabricated, factory finished, related flashings, anchorage and attachment devices.

C. Interior windows include tubular aluminum sections without thermal brake, with slide-in 1/4 inch infill, glazing, adapter, shop fabricated, factory finished, related flashings, anchorage and attachment devices.

D. System Assembly: Site assembled.

1.04 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall:

1. As calculated in accordance with U.B.C. code,

2. As measured in accordance with ASTM E330.

B. Deflection: Limit mullion deflection to flexure limit of glass, 1/200 of span; with full recovery of glazing materials.

C. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

D. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft (0.0003 cu m/s/sq m)) of wall area, measured at a reference differential pressure across assembly of 1.57 psf (75 Pa) as measured in accordance with AAMA 501.2 ASTM E283.

E. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

F. Water Leakage: None, when measured in accordance with AAMA 501,2m /astm E331 with a test pressure difference of 2.86 lbf/sq ft (136.85 N/sq m).

G. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components and anchorage.

H. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.05 SUBMITTALS FOR REVIEW

A. Section 01 32 00 - Submittals: Procedures for submittals.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware and internal drainage details.

C. Design Data: Provide framing member structural and physical characteristics, calculations, dimensional limitations.

D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

E. Submit two samples 4 x 6 inches (100 x 150 mm) in size illustrating finished aluminum surface, glass units, infill panels, glazing materials.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Conform to requirements of ANSI A117.1.

C. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum three years documented experience.

D. Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Indiana.

1.07 PRE-INSTALLATION MEETING

A. Section 01 31 00 - Coordination and Meetings: Pre-installation meeting.

B. Convene one week before starting work of this section.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 - Material and Equipment: Transport, handle, store, and protect products.

B. Handle Products of this section in accordance with AAMA-Curtain Wall Manual #10.

C. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.09 WARRANTY

A. Section 01 77 00 - Contract Closeout.

B. Correct defective Work within a five (5) year period after Substantial Completion.

C. Warranty: Include coverage for complete system for failure to meet specified requirements.

D. Provide five (5) year manufacturer warranty glazed units.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Special-Lite: Monumental

B. All others must submit for approval

2.02 MATERIALS

A. Extruded Aluminum: ASTM B221.

B. Sheet Aluminum: ASTM B209.

C. Sheet Steel: ASTM A446/A446M; galvanized in accordance with G90.

D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections.

E. Fasteners: Stainless steel.

2.03 COMPONENTS

A. Windows and Frames: 2" x 4-1/2" (50 x 113 mm) nominal dimension; thermally broken with interior tubular section insulated from exterior; applied glazing stops; drainage holes; internal weep drainage system. Frames for interior glazing need not to be thermally broken, use slide-in infill adapter for 1/4 inch glazing.

B. Doors: Special-Lite: Monumental SL-15 Wide Stile Door

C. Flashings: Aluminum Kynar finish as selected to match mullion sections where exposed.

D. Firestopping: Specified in Section 07 84 13.

2.04 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified 08 81 00 as indicated on drawings.

B. Glazing Materials: As specified in Section 08 81 00. Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 SEALANT MATERIALS

A. Sealant and Backing Materials:

1. Perimeter Sealant: Type Silicone as specified in Section 07 92 00.

2. Sealant Used Within System (Not Used for Glazing): Type Silicone as specified in Section 07 92 00.

2.06 HARDWARE

A. Hinges: Select continuous gear hinge.

B. Pivots: Offset type; top and bottom.

C. Refer to Section 08 71 01 for approved Manufacturers for door hardware.

2.07 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Reinforce interior horizontal head rail to receive drapery and blind track brackets and attachments.

F. Prepare components with internal reinforcement for door hardware.

G. Reinforce framing members for imposed loads.

2.08 FINISHES

A. Finish Coatings: Conform to AAMA 603.8, AAMA 605.2, AAMA 606.1, AAMA 607.1, AAMA 608.1.

B. Exterior Exposed Aluminum Surfaces: Fluorocarbon coating, 7 mil (0.4 mm) thick to custom color as selected.

C. Interior Exposed Aluminum Surfaces: Fluorocarbon coating, 7 mil (0.4 mm) thick to custom color as selected.

D. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 2.0 oz/sq ft (610 gm/sq m). Primed with iron oxide paint.

E. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

F. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.

G. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

H. Extent of Finish:

1. Apply factory coating to all surfaces exposed at completed assemblies.

2. Apply finish to surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Section 01 31 00 - Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify dimensions, tolerances, and method of attachment with other work.

C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

D. Align assembly plumb level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill and edge flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Install flashings and trim.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided.

L. Install glass and infill panels in accordance with Section 088000, to dry method of glazing.

M. Install perimeter sealant Type Silicone, backing materials, and installation criteria in accordance with Section 07 92 00.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill and edge flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter air and vapor barrier materials.

I. Install flashings and trim.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

L. Install glass and infill panels in accordance with Section 08 81 00, to dry method of glazing.

M. Install perimeter sealant Type Silicone, backing materials, and installation criteria in accordance with Section 07 92 00.

3.03 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Control: Tolerances

B. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.

C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 ADJUSTING

A. Section 01 77 00 - Contract Closeout: Adjusting installed work.

B. Adjust operating hardware for smooth operation.

3.05 CLEANING

A. Section 01 77 00 - Contract Closeout: Cleaning installed work.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION OF FINISHED WORK

A. Section 01 77 00 - Contract Closeout: Protecting installed work.

B. Protect finished Work from damage.

END OF SECTION 08 43 13

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide materials, labor and equipment necessary to install the work of this Section in accordance with the intent of the Contract Documents. Items to this Section shall include but are not necessarily limited to the following:

1. Aluminum Window/Curtain Wall Frames (Type B as shown on the Drawings)
2. Anchors and attachments as required to secure any of the work in this Section.
3. Break metal enclosures between glazed openings as shown on the Drawings.

B. Related Work Specified Elsewhere:

1. Section 07 92 00 Sealants
2. Section 08 81 00 Glazing
3. Section 08 51 13 Aluminum Windows

1.02 INDUSTRY STANDARDS

A. Publications of the following institutes and associations are referred to in this section.

1. American National Standards Institute, A.N.S.I.
2. Architectural Aluminum Manufacturer's Association, A.A.M.A.
3. American Society of Testing Materials, A.S.T.M.

1.03 SUBMITTALS

A. Shop drawings showing construction of all parts, metal thicknesses, installation and erection details including connections, anchorage, fastening, and sealing methods.

1. Include sections of typical members, dimensioned elevations, frame sizes, spacing of anchors and fasteners, and details of accessories.

B. Manufacturer's recommended installation and maintenance procedures.

C. Test Reports: Reports of source quality control tests.

D. Certificates: Manufacturer's certificate that materials meet specification requirements.

1.04 QUALITY ASSURANCE

A. The design and specifications are based on the 1600 S.S.G. Curtainwall, as manufactured by the Kawneer Company, Inc. It is not the intent of these specifications to restrict the products of this Section to one manufacturer. Equals must be approved in writing prior to bidding by the Architect.

B. Equal:

1. Wausau
2. Marmet
3. P.P.G.

1.05 GUARANTEE

A. Window Wall System shall be guaranteed against failure of materials or workmanship to include excessive leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess of normal weathering, and defects in hardware and weather stripping for two (2) years.

1.06 FIELD MEASUREMENTS

A. Obtain all necessary field measurements and accurately fit this work with the work of others.

1.07 PRODUCT PERFORMANCE

A. Submit a list of at least five (5) completed projects of similar nature and scope to the Architect listing name, locations and Architect.

B. Air infiltration shall be tested in accordance with ASTM E 283 and shall not exceed .06 CFM per square foot of fixed area.

C. Water infiltration shall be tested in accordance with ASTM E 331. No water penetration shall occur at a test pressure of 6.24 p.s.f.

D. Structural Performance shall not exceed a maximum deflection of 1/175 of the span under a windload of 30 p.s.f. in accordance with ASTM E330 and based on a safety factor for allowable stress of 1.65.

E. Thermal Barrier: There shall be a thermal separation between the exterior and interior metal surfaces.

F. Test requirements are minimum and any tests failing to meet the minimum requirements will be cause to reject the proposed window wall systems.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. General:

1. Sections shall be extruded from 6063 alloy and temper (ASTM B221 alloy G.S.10A-T5) or equivalent. Vertical and horizontal sections shall be provided with closed cell sponge insulating strips, forming a .125 inch thermal break between interior and exterior components.

2. All curtain wall sections shall be of overall dimensions, wall thicknesses and basic configurations as shown on architectural details. Tubular verticals and horizontals are to be positioned to the interior of building structure, and screw fastened pressure plates with covers to the exterior.

B. Joinery: Vertical sections shall run thru and be flush with horizontal sections at interior and exterior faces. All frame intersections shall be coped or square cut. Curtain wall sections shall be completely factory fabricated and delivered to job site unassembled. The curtain wall field erector shall mechanically affix joinery with stainless steel and aluminum connection angles, and shall seal to assure watertightness.

C. Glazing: Curtain wall sections shall be designed for gasket glazing. All glazing pockets shall have a width of .312 inches plus glass or panel thickness, at a depth of 1.000 inch (when sections detailed have a 2.500 inch face). Glass or panels shall be retained in main sections by screw attached pressure plates at exterior face (allowing for installation or replacement from the exterior).

D. Gaskets: Glass and panels shall be retained in curtain wall sections by closed cell sponge, arrowed neoprene gaskets inserted in gasket holds of main window sections. Dense, arrowed, neoprene gaskets shall be inserted in gasket holds of exterior pressure plates. All gaskets shall be reusable for replacement glazing and shall be colored black.

E. Anchorage: Window units shall be secured to the building structure with allowances made for installation sequence, building movement, thermal movement of aluminum, and standard window opening construction tolerances. All materials employed shall be aluminum or noncorrosive materials compatible with aluminum; fasteners shall be stainless steel or

cadmium plated steel, all steel clips and/or steel anchors, if used, shall be zinc plated. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from the aluminum. All fasteners, expansion channels, clips and anchors, utilized as subject project requires, must be of adequate alloy, size and spacing to assure the structural integrity of window units.

F. Breakmetal enclosures shall be of 090" aluminum. The enclosures shall be formed, then anodized in the finish indicated in 2.04 A. of this Specification. Submit appropriate detailing in shop drawing submittal for Architect review.

2.02 FINISH

A. Window Units: All exposed aluminum surfaces shall receive a clear finish by caustic etch and anodic treatment to obtain an Architectural Class II coating conforming to Aluminum Association Standard AA-M12C22A42/44. Color shall be Permanodic #40 Dark Bronze. All finishes shall match the approved color sample in the Architect's office.

B. Hardware: All exposed metallic hardware shall receive a protective clear lacquer to reveal the natural metal as specified for hardware.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Aluminum Wall System shall be erected by an experienced erector, approved by the Manufacturer and Architect.

B. Comply with manufacturer's instructions for installation.

C. Set system plumb, level, and true-to-line, without warp or rack of frames.

D. Anchor system solidly to surrounding construction to prevent distortion or misalignment.

E. Perimeter sealant work specified in Section 07 92 00.

F. Glazing work specified in Section 08 81 00.

3.02 FIELD REQUIREMENTS

A. Obtain all necessary field measurements and accurately fit this work with the work of others.

3.03 DISSIMILAR MATERIALS

A. All aluminum materials which will be placed in contact with concrete, masonry, mortar, plaster or dissimilar metals shall be back painted with a heavy coat of alkali-resistant bituminous paint.

END OF SECTION 08 44 11

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PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Basic finish hardware requirements.

B. Related Sections:

1. Section 06 20 00 - Finish Carpentry: Installation of finish hardware.
2. Section 08 11 13 - Hollow Metal Doors and Frames.
3. Section 08 14 16 - Wood Doors.
4. Section 08 14 29 - Veneer Wood Doors
5. Section 08 71 01 - Hardware Specification Guidelines

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows
2. Cabinets of all kinds, including open wall shelving and locks.
3. Signs, except as noted.
4. Toilet accessories of all kinds including grab bars.
5. Rough hardware.
6. Folding partitions, except cylinders where detailed.
7. Sliding aluminum doors.
8. Angle sill threshold.
9. Corner guards.

1.02 SUBMITTALS

A. Submit in electronic format (PDF) the hardware schedule at earliest possible date prior to delivery of hardware. Organize schedule into "Hardware Sets" with an index of doors and heading, indicating complete designations of every item required for each door or opening. Include the following information:

1. Type, style, function, size, quantity and finish of each hardware item.
2. Name, part number and manufacturer of each item.
3. Location of hardware set cross referenced to indications on drawings both on floor plans and in door schedule.
4. Explanation of all abbreviations, symbols, and codes contained in schedule.
5. Mounting locations for hardware.
6. Door and frame sizes and materials.
7. Submit manufacture's technical data and installation instructions for the electronic hardware.
8. Provide samples of hardware for Owner review.
9. Catalog cuts.

B. Templates: Where required, furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from only one manufacturer, although several may be indicated as offering products complying with requirements.

2. Hardware supplier shall be a direct factory contract supplier who has in his employment a certified architectural hardware consultant (AHC) who is available at all reasonable times during the course of the Work, and for project hardware consultation to the Owner, Architect, and Contractor.

B. Schedule Designations: Except as otherwise indicated, the use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish function, or other quality of significance. See 1.02 A for substitutions.

C. Exit Doors: Openable at all times from the inside without the use of a key or any special knowledge or effort.

D. Fire-rated openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80. This requirement takes precedence over other requirements for such hardware. Provide only such hardware which has been tested and listed by UL for the type and size of door required, and complies with the requirements of the door and the door frame labels. Latching hardware, door closers, ball bearing hinges, and seals are required whether or not listed in the Hardware schedule.

1. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label on exit device indicating "Fire Exit Hardware."

1.04 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at the Site: Individually package each unit of finish hardware complete with proper fastening and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

B. Deliver packaged hardware items at the times and to the locations (shop or field) for installation, as directed by the Contractor.

1.05 PROJECT CONDITIONS

A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.06 PRE-INSTALLATION MEETING

A. Schedule a hardware pre-installation meeting on site and discuss the installation of all types of hardware on the Project.

B. Meeting attendees shall be notified seven (7) days in advance and shall include the Architect, Contractor Hardware Installers, all Manufacturers Representative, any other effected sub-contractor or supplier and the Owner’s Locksmith.

1.07 WARRANTY

A. Provide guarantee from hardware supplier as follows:
1. Closers: Ten years; except electronic closers: Two years.
2. Exit Devices & Locksets: Three years
3. All other Hardware: Two years.

PART 2 – PRODUCT

2.01 MANUFACTURERS

A. The approved Manufacturers are listed in every item of this Part 2 Specification Section. These Manufacturers are based on Owner's building standards for door hardware. The Owner maintains this hardware and is currently stocking replacement parts.

B. All others must submit for approval a minimum of ten (10) calendar days prior to Bid Date.

2.02 HANGING DEVICES

A. Mortise Hinge

1. Heavy Weight Exterior
   a. Stanley FBB199
   b. McKinney TA3386
   c. Hager BB1199
2. Standard Weight Exterior
   a. Stanley FBB191
   b. McKinney TA2314
   c. Hager BB1191
3. Heavy Weight Interior
   a. Stanley FBB168
   b. McKinney TA3786
   c. Hager BB1168
4. Standard Weight Interior
   a. Stanley FBB179
   b. McKinney TA2714
   c. Hager BB1279

Notes:

- Provide DHI recommended size for height and width of door.
- Provide proper quantity of hinges for height of door.
- NRP (Non Removable Pin) at Reverse bevel locked Doors.
- Hinge tips to match existing for additions and alterations to existing buildings.
- Field verify size and finish of existing for door only replacement projects.

B. Continuous Hinge

1. Full Surface
   a. Stanley 664HD
   b. Select SL21HD
   c. Hager 780-057HD
   d. Pemko _ FS
2. Full Mortise- Hollow Metal Doors
   a. Stanley 662HD
   b. Select SL24HD
   c. Hager 780-224HD
   d. Pemko _ FM

3. Full Mortise- Wood Doors
   a. Stanley 661HD
   b. Select SL11HD
   c. Hager 780-111HD
   d. Pemko FM _ SLF / SLI

Notes:
- Continuous hinges are to be used at exterior openings and vestibule entrances only.
- Continuous hinges are NOT to be used at interior openings other than vestibules for exterior entrances
- Use continuous hinges on perimeter doors unless there is an historic requirement.
- Use continuous hinges on interior high cycle openings.
- Field verify requirements for Pivots and Floor Closers for additions and alterations to existing buildings.
- Avoid floor closers and pivots on new construction.

2.03 LOCKSETS

A. Mortise Lock
   1. Best Series 45H *(No Substitutions)*
      a. Design 15J Full Escutcheon
      b. Design 15H Sectional Trim
   2. Function Designation
      a. Passage Best: N
      b. Office Best: AT
      c. Privacy Best: LT
      d. Privacy – Staff Best: H-VIN
      e. Storeroom Best: D

Note: Provide lock functions as required for project and space as appropriate

B. Electronic Mortise Lock
   1. Best Series 45HW *(No Substitutions)*
      a. Design 15J Full Escutcheon
      b. Design 15H Sectional Trim
   2. Function Designation
      a. Fail Secure Best: DEU
      b. Fail Safe Best: DEL

Note: Specify quick connect wire connections for low voltage terminations.
Best “C”
Corbin Russwin “Lynx”

C. Cylindrical Lock
   1. Best Series 9K *(No Substitutions)*
      a. Design 15D Flat Lever w/Return
      b. Design 16D Straight Lever

2. Function Designation
   a. Passage Best: N
   b. Office Best: AB
   c. Privacy Best: L
   d. Privacy – Staff Best: H
   e. Storeroom Best: D

Note: Provide lock functions as required for project and space as appropriate

D. Electronic Cylindrical Lock
   1. Best Series 9K (No Substitutions)
      a. Design 15D Full Escutcheon
      b. Design 16D Sectional Trim
   2. Function Designation
      a. Fail Secure Best: DEU
      b. Fail Safe Best: DEL

Note: Specify quick connect wire connections for low voltage terminations. Best "C

E. Cylinders
   1. Best Mortise Cylinders1E Series *(No Substitutions)*
   2. Rim Cylinders12E Series *(No Substitutions)*

Note: Provide as necessary to operate locking hardware

F. Key System
   1. Best *(No Substitutions)*
      a. Small Format Interchangeable Core
      b. 7-pin Best SFIC

Note: Cores must be supplied as part of the construction hardware

2.04 EXIT DEVICES

A. Exit Devices

1. **Precision Apex Series 2000**

a.	Rim Device	2100
b.	Rim Device–Fire Rated	FL2100
c.	Surface Vert Rod Device	2200
d.	Surface Vert Rod-Fire Rated	FL2200
e.	Mortise Device	2300
f.	Mortise Device-Fire Rated	FL2300
g.	Rim Device-Narrow Stile	2400
h.	Rim Device–Narrow Stile-Fire Rated	FL2400
i.	Con Vert Rod Device-Narrow Stile	2600
j.	Con Vert Rod Device -Narrow Stile-Fire Rated	FL2600
k.	Con Vert Rod Device-Wood Door	2700
l.	Con Vert Rod Device -Wood Door-Fire Rated	FL2700
m.	Con Vert Rod Device	2800
n.	Con Vert Rod Device-Fire Rated	FL2800

2. **Von Duprin Series 35 / 98**

a.	Rim Device	98
b.	Rim Device–Fire Rated	98-F
c.	Surface Vert Rod Device	9827
d.	Surface Vert Rod-Fire Rated	9827-F
e.	Mortise Device	9875
f.	Mortise Device-Fire Rated	9875-F
g.	Rim Device-Narrow Stile	35A
h.	Rim Device–Narrow Stile-Fire Rated	35A-F
i.	Con Vert Rod Device-Narrow Stile	3347A
j.	Con Vert Rod Device -Narrow Stile-Fire Rated	3347A-F
k.	Con Vert Rod Device-Wood Door	9847WDC
l.	Con Vert Rod Device -Wood Door-Fire Rated	9847WDC-F
m.	Con Vert Rod Device	9847
n.	Con Vert Rod Device-Fire Rated	9847-F

3. Panic Device Function Designation

a.	Exit Only	Precision: 01	Von Duprin: EO
b.	Pull Only	Precision: 02	Von Duprin: DT
c.	Key Retracts Latch Bolt	Precision: 03	Von Duprin: NL
d.	Lever Locked / Unlocked	Precision: 08	Von Duprin: L
e.	Lever Always Free	Precision: 15	Von Duprin: L-BE

Note: Precision Apex 2000 Series

- For use on new construction projects.
- “A” Lever design on interior applications.
- “A” Pull design on exterior applications.
- Field verify existing pull design on projects where there is an historic requirement.
- Hex Key Dogging on Non-Fire Rated applications.
- Single Doors – Rim style device preferred over mortise panics
- Pairs of Doors – (2) Rim style devices and a Mullion.
- Mullions to be Key Removable.
- Latch bolts on Electrified Exit Devices to use Motor retraction not solenoid retraction unless matching existing

B. Exit Device Accessories

1. Lockdown Panic Button
   a. Trimco LDH100

Note: Must be used in conjunction with all non-fire rated exit devices

2.05 MECHANICAL CLOSING DEVICES

A. Surface Closer

1. Dorma 8900
2. LCN 4040XP
3. Stanley/Dormakaba Commercial Hdw QDC100

Note:

- Proper Arm as Required.
- Provide heavy duty EDA Parallel arms.
- Provide SNB at All closers.
- All door frames to be reinforced.

B. Concealed Closers
   1. Dorma RTS88 series
      a. RTS25 model – Aluminum Storefront Openings
      b. RTS27 model - Hollow Metal Openings
   2. LCN 2000 series
      a. 2010/2030 models

2.06 AUTOMATIC OPERATORS

A. Low Energy- Automatic Operator
   1. Dorma ED900
   2. LCN 4642

Note:

- Push Plate Actuation
- Provide where noted ADA required on drawings

2.06 STOPS & HOLDERS

A. Door Stops
   1. Trimco
   2. Rockwood
   3. Hager
   4. Ives
   5. Design Hardware

Note:

- Allow for maximum swing of door.
- Can use both floor stops and wall stops
- Backing required at wall stop.

B. Overhead Stops
   1. Dorma 700 / 900
   2. Rixon 6-x / 9-x
   3. Rockwood OH100 / OH900
   4. Glynn Johnson 90 / 100

2.07 TRIM & ACCESSORIES

A. For the following items all Manufacturers are approved using their standard product for the item listed.

1.	Flat Goods	Hager, Ives, Rockwood, Design Hardware
2.	Threshold	National Guard, Pemko, Zero, Design Hardware
3.	Weather Seals	National Guard, Pemko, Zero, Design Hardware
4.	Door Sweeps	National Guard, Pemko, Zero, Design Hardware
5.	Smoke Seals	National Guard, Pemko, Zero, Design Hardware

2.08 ELECTRONIC COMPONENTS

A. Power Transfer

1.	Precision	EPT-12C
2.	Securitron	EL-CEPT
3.	Von Duprin	EPT-10 CON

Note: Specify quick connect wire connections for low voltage terminations.

B. Door Position Switches
   1. Sargent 3280
   2. Security Door Controls DPS
   3. Securitron DPS
   4. RCI 9540

C. Power Supplies
   1. Alarm Controls APS
   2. Security Door Controls 630
   3. Von Duprin PS
   4. Precision PS/RPS series
   5. RCI 10-series

2.09 ELECTRIC STRIKES

A. Electric Strikes
   1. Dorma
   2. Best
   3. RCI
   4. Von Duprin

2.10 MISCELLANEOUS

A. Pad Locks
   1. Best 21B series

Note: Weather Cover Required for Exterior Applications

2.11 MATERIALS

A. Locksets: All locksets and latchsets shall be extra-heavy-duty cylindrical with Best 7-pin interchangeable core. Lockset and Cores to be of the same manufacturer to maintain complete lockset warranty. Locks to have solid shank with no opening for access to keyed lever keeper. Keyed lever to be protected by means of a break-away mechanism to prevent forced entry, when excessive torque is applied, a replaceable part will shear. Lock chassis must be through-bolted (outside of the lock chassis prep to prevent rotation of chassis after installation. Lock manufacturer shall provide a three-year warranty, in writing, to the Owner, along with three copies of the lock service manual. Strikes shall be 16 gauge curved brass, bronze or stainless steel with a 1” deep box construction, and have sufficient length to clear trim and protect clothing.

B. Mortise type Locks and Latches shall be heavy-duty with hinged, anti-friction, 3/4 inch throw latchbolt with anti-friction piece made of self lubricating stainless steel. Functions and design as indicated on the hardware groups. Deadbolt functions shall be 1 inch projection made of hardened stainless steel. both deadbolt and latchbolt are to extend into the case a minimum of 3/8 inch when fully extended. Furnish locksets and latchsets with sufficient curved strike lip to protect door trim. Provide locksets with 7-pin interchangeable core cylinders. All mortise cylinders shall have a concealed internal set screw for securing the cylinder to the lockset. The internal set screw will be accessible only by removing the core from the cylinder body. Locksets and latchsets to have self-aligning, thru-bolted trim. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated. Lever handles must be of forged or cast brass, bronze or stainless steel construction. Levers which contain a hollow cavity are not acceptable. Spindle to be such that if forced it will twist first, then break, thus preventing forced entry. Levers to be operated with a roller bearing spindle hub mechanism.

   1. Grade 1 Cylindrical Locks shall have minimum 9/16 throw. All deadbolts shall have 1-inch minimum throw.

PART 3 – EXECUTION

3.01 BASIC REQUIREMENTS

A. Furnish all items of hardware required to complete the work in accordance with specifications and plans.

B. Carefully inspect Project for the extent of the finish hardware required to complete the Work. Where there is a conflict between these Specification and the existing hardware furnish finish hardware to specification.

C. Door and frame prep

1. Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8” high); hinge preps will be mortised and reinforced with a minimum of 10 gauge reinforcement material; minimum of 14 gauge reinforcement material for closer and all surface mounted hardware. Hollow metal doors shall be properly prepared and reinforced with a minimum of 16 gauge material for either mortised or cylindrical locks as specified. All hollow metal doors receiving door closers or other surface mounted hardware to have 14 gauge reinforcement. The use of sex bolts is mandatory. Wood doors shall be factory prepared to receive the scheduled hardware.

D. Hardware Finishes

1. The finish for the hardware items will be project specific. Field verification is required for additions and alterations of existing buildings.

E. Hardware installation

1. The manufacturer’s representative for the locking devices and closing devices must inspect and approve, in writing, the installation of their products. Hardware installed incorrectly must be reported to the architect prior to the architect’s final punch list.

2. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

3. Installation shall conform to local governing agency security ordinance.

3.02 KEYING REQUIREMENTS

A. Provide construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished on the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished by the Best factory representative as part of the hardware package to the General or Prime Contractor for delivery to the Owner a minimum of two (2) weeks prior to occupancy.

B. All cylinders shall be Best 7-pin, interchangeable core.

C. Furnish two (2) key blanks per core provided in the proper keyway configuration as directed by the University Locksmith

D. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Best Access Systems Factory Representative. All Construction cores and control keys remain the property of Best Access Systems.

3.03 HARDWARE LOCATION

A. Hinges:
   1. Bottom Hinge: 10 inches from door bottom to bottom of hinge.
   2. Top Hinge: 5 inches from door top to top of hinge.
   3. Center Hinge: Center between top and bottom hinge.
   4. Extra Hinge: 6 inches from bottom of top hinge to top of extra hinge.

B. Lock: 38 inches from finished floor to center of lever or knob.

C. Push Bar: 44 inches from bottom of door to center of bar.

D. Push Plate: 44 inches from bottom of door to center of plate.

E. Pull Plate: 42 inches from bottom of door to center of pull.

F. Exit Device: 39-13/16 inches from finished floor to center of pad.

G. Deadlock Strike: 44 inches from floor, centered.

3.04 ADJUSTING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.

B. Inspection: Hardware supplier shall inspect all hardware furnished within 10 days of contractor's request and include with his guarantee a statement that this has been accomplished. Inspector or Contractor shall sign off the hardware as being complete and correctly installed and adjusted. Further corrections of defective material shall be the responsibility of his representative.

3.05 ADJUSTMENTS AND CLEANING

A. At final completion, and when HVAC is operational and balanced, installer shall make final adjustment to and verify proper operation of all door closers and other hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.

B. All hardware shall be left clean and in good condition. Hardware found to be disfigured, defective or inoperative shall be repaired or replaced.

END OF SECTION 08 71 00

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Provide all labor, materials and equipment necessary to install glazing necessary to satisfy the intent of the Contract Documents. This work shall include but shall not necessarily be limited to the following:

1. Windows
2. Doors
3. Sidelites, transoms and interior window lites.

B. Work Not Included:

1. Unit Skylights

C. Related Work Specified Elsewhere:

1. Section 08 13 13 Metal Doors
2. Section 08 14 16 Wood Doors
3. Section 08 14 29 Flush Veneer Wood Doors
4. Section 08 51 13 Aluminum Windows

1.02 INDUSTRY STANDARDS

A. Publications of the following institutes, associations, societies and agencies are referred to in this section.

1. Flat Glass Jobbers Association, FGJA.
2. Underwriter's Laboratories, Inc., U.L.

1.03 SUBMITTALS

A. Submit 4 x 8 inch samples of each type of glazing and one labeled unit of each glazing material to the Architect for approval.

B. Furnish full size installation drawings in electronic format (PDF) of each type of glazing rabbet to the Architect for approval prior to fabrication or installation of any glass.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Insulating Glass (standard double glazed units):

1. Exterior light: 1/4" tinted, solar bronze, float glass.(Tint shall match ISU Standard)
2. Interior light:1/4" clear, float glass
3. Unit Thickness: 1"
4. Standards:
   a. TWINDOW by PPG Industries, Inc.
   b. THERMOPANE by Libbey-Owens-Ford Company
   c. INSULATED GLAZING by Glasmont Corporation

B. Insulating Glass (special double glazed units as noted on drawings):

1. Exterior Light: 2 layers of 1/8" float glass with .060 vinyl laminate between (Exterior layer shall be tinted to match ISU Standard, interior layer shall be clear.)

2. Interior Light: 2 layers of 1/8" clear float glass with .060 vinyl laminate between
3. Unit thickness: 1"
4. Standards:
   a. TWINDOW by PPG Industries, Inc.
   b. THERMOPANE by Libbey-Owens-Ford Company
   c. INSULATED GLAZING by Glasmont Corporation

C. Laminated Plate

1. Unit Thickness: 1/4" or as indicated on the Drawings
2. Standards:
   a. SAFLEX by Monsanto
   b. Laminated by L.O.F.

D. Tempered Plate (Clear or Tinted)

1. Unit Thickness: 1/4" or as indicated on the Drawings
2. Standards:
   a. TRU-TEMP FLOAT by ASG Industries
   b. TUF-FLEX FLOAT by Libbey-Owens-Ford
   c. HERCULITE FLOAT by PPG Industries

E. Clear Float Glass

1. Unit thickness: 1/4" or as indicated on the Drawings
2. Standards:
   a. PPG Industries
   b. Libbey-Owens-Ford Company

F. Welded Wire Float Glass, U.L. Listed

1. Unit thickness: 1/4"
2. Standards:
   a. Polished Nu-Weld by ASG Industries
   b. Baroque polished wire by Libbey-Owens-Ford
   c. Polished baroque by Mississippi Wire Glass
3. Wire shall be vertical and horizontal in the glass.

G. Spandrel Insulated Glazing

1. Exterior Light: 1/4" tinted, solar bronze (Tint shall match ISU Standard), heat-strengthened spandrel coating to be on Surface #2.)
2. Unit thickness: 1"
3. Standards:
   a. Virginia Glass
   b. Hordis Glass Products
4. Spandrel coating color to be selected by Architect from manufacturer's standard colors.

H. Glazing Compound, Standards:

1. FLEXIGLAZE
2. M-251 by Pecora
3. CHANNEL GLAZING COMPOUND By Tremco

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and as indicated in the drawings.

B. All glazing scheduled for doors sidelights and transoms shall be of wire glass in label bearing doors/frames. Otherwise, provide laminated plate per U.B.C. requirements.

END OF SECTION 08 81 00

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PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Gypsum Wallboard is required on all interior walls and ceiling surfaces in this work as indicated on the Drawings.

1.02 PRODUCT HANDLING

A. Delivery and Handling:
   1. Deliver materials to the project site with manufacturer's labels intact and legible.
   2. Handle materials with care to prevent damage.
   3. Deliver fire-rated materials bearing testing agency label and required fire classification numbers.

B. Storage:
   1. Store materials inside under cover, stack flat, off floor.
   2. Stack wallboard so that long lengths are not over short lengths.
   3. Avoid over-loading floor system.
   4. Store adhesives in dry area. Provide protection against freezing at all times.

C. Protection: Use all means necessary to protect the materials of this section before, during and after installation, and to protect the installed work of other trades.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, and at no additional cost to the Owner.

1.03 QUALITY ASSURANCE

A. Use only qualified journeymen. In the acceptance or rejection of installed gypsum wallboard, no allowance will be made for lack of skill on the part of the drywall Subcontractor.

B. Where fire-resistive gypsum wallboard assemblies are required, adhere to assemblies and guidelines as published by the Gypsum Association in the current edition of the Gypsum Association's Fire Resistance Design Manual.

1.04 REFERENCES/STANDARDS

A. ASTM C36 -Gypsum Wallboard

B. ASTM C79 -Gypsum Sheathing Board

C. ASTM C442 -Gypsum Backing Board and Core Board

D. ASTM C514 - Nails for the Application of Gypsum Wallboard

E. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board

F. ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board or Water Resistant Backing Board

G. ASTM C840 - Application and Finishing of Gypsum Board

H. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board

I. ASTM E119 - Fire Tests of Building Construction and Materials

J. GA-201 - Gypsum Board for Walls and Ceilings

K. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board

L. GA-600 - Fire Resistance Design Manual

1.05 JOB CONDITIONS

A. Environmental Conditions:

1. Temperature: During cold weather, in areas receiving wallboard installation, maintain temperature storage between 55 degrees F. to 70 degrees F. (13 degrees C. to 21 degrees C.) for 24 hours before, during, and after gypsum wallboard and joint treatment application.

2. Ventilation:

a. Provide ventilation during and following adhesives and joint treatment application.

b. Protect installed materials from drafts during hot, dry weather.

B. Protection: Protect adjacent surfaces against damage and stains.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Gypsum Wallboard

1. Water resistant board shall be in thicknesses and locations as indicated on the drawings.

2. Regular board shall be in thickness as indicated on the drawings.

B. Concrete GFR wallboard

1. All surfaces to receive ceramic tile finish shall be covered with 7/16" concrete glass-fiber-reinforced wallboard.

C. Fasteners:

1. Gypsum wallboard screws

2. Screw length for wood or metal stud application:

a. Single layer 5/8" wallboard application: 1 5/8", Bugle head screw.

D. Grillage:

1. Running Channels: 1 1/2" cold rolled galvanized steel.

2. Cross furring channels: 3/4" cold rolled galvanized steel.

3. Hangers: Minimum of No. 12 gauge galvanized annealed wire.

4. Note: Gypsum wallboard lath suspension system 650 by Chicago Metallic Corporation is an acceptable equal.

E. Accessories:

1. Drywall Reveal Molding: Style WOM-625-75 by Fry Reglet Corporation.

2. Surface-Mounted Corner Guard: Type CGS-3 by Balco, Inc.

3. Color to be selected by Architect.

PART 3 – EXECUTION

3.01 INSPECTION

A. Check framing for accurate spacing and alignment.

B. Verify that spacing of installed framing does not exceed maximum allowable of thickness of wallboard to be used.

C. Verify that door frames are set for thickness of wallboard to be used.

D. Do not proceed with installation of wallboard until deficiencies are corrected and surfaces to receive wallboard are acceptable.

3.02 APPLICATION

A. General:

1. Use wallboard of maximum lengths to minimize end joints.
2. Stagger end joints when they occur.
3. Locate end joints as far as possible from center of wall or ceiling.
4. Abut wallboards without forcing.
5. Neatly fit ends and edges of wallboard.
6. Support ends and edges of wallboard panels on framing or furring members.
7. Follow manufacturer's installation recommendations.
8. Stagger vertical joints on opposite side of partition to occur on different
9. Place all board so that all joints occur at center of studs or furring channels.
10. Make all joints tight and accurate, keeping adjacent boards in flush planes.
11. Cut and fit boards neatly and accurately around electrical boxes, light fixtures, grilles, registers, diffusers, and similar items so that evidence of cutting and fitting will be concealed by cover plates, flanges, or trim.
12. Seal cut edges where such cuts occur in water-resistant board according to the manufacturer's recommendations.
13. Where full height walls and walls containing acoustic or thermal insulation are indicated on the drawings, install sealant at the perimeter of such gypsum drywall surfaces and around all items protruding through such surfaces. Refer to Section 09260, Acoustical Treatment for Partitions/Ceilings, for specific information.
14. Provide control joints in continuous runs of wall exceeding 30'-0" (vertical or horizontal). Coordinate the location of all control joints with the Architect prior to installation.
15. Provide control joints at all locations where secured to structural steel to provide isolation from wallboard secured to partition framing.

B. Single Layer Application:

1. Vertical surfaces: Space screws a maximum 8" o.c. in field of panel and 8" o.c. along vertical abutting edges. Stagger screws on abutting edges or ends.
2. Horizontal surfaces: Space screws maximum 6" o.c. in field of panel and 6" o.c. along abutting end joints. Stagger screws on abutting edges or ends.

C. Joint System

1. Prefill:
    a. Fill "V" grooves formed by abutting rounded edges of wallboard with prefill joint compound.
    b. Fill "B" joint flush and remove excess compound beyond groove.
    c. Leave clear depression to receive tape.
    d. Permit prefill joint compound to harden prior to application of tape.

2. Taping and finishing joints:
    a. Taping or embedding joints:
        1) Apply compound in thin uniform layer to all joints and edges to be reinforced.
        2) Apply reinforcing tape immediately.
        3) Center tape over joint, and seat tape into compound.
        4) Leave approximately 1/64" (0.05mm) to 1/32" (.1mm) compound under tape to provide bond.
        5) Apply skim coat immediately following tape embedment, but not to function as fill or second coat.
        6) Fold tape and embed in angles to provide true angle.
        7) Dry embedding coat prior to application of fill coat.
    b. Filling:
        1) Apply joint compound over embedding coat.
        2) Fill taper flush with surface.
        3) Apply fill coat to cover tape.
        4) Feather out fill coat beyond tape and previous joint compound line.
        5) Do not apply fill coat on interior angles.
        6) Allow fill coat to dry prior to application of finish coat.
    c. Finishing:
        1) Spread joint compound evenly over and beyond fill coat on all joints.
        2) Feather to smooth uniform finish.
        3) Apply finish coat to taped angles to cover tape and taping compound.
        4) Sand final application of compound to provide surface ready for decoration.
3. Filling and finishing depressions:
    a. Apply joint compound as first coat to fastener depressions.
    b. Apply at least two additional coats of compound after first coat is dry.
    c. Leave filled and finished depressions level with plane of surface.
4. Finished beads and trim:
    a. First fill coat:
        1) Apply joint compound to bead and trim.
        2) Feather out from ground to plane of the surface.
        3) Dry compound prior to application of second fill coat.
    b. Second fill coat:
        1) Apply joint compound in same manner as first fill coat.
        2) Extend beyond first coat onto face of wallboard.
        3) Dry compound prior to application of finish coat.
    c. Finish coat:
        1) Apply joint compound to bead and trim.
        2) Extend beyond second fill coat.

D. Metal Trim:

1. The drawings do not propose to show all metal trim required; verify with the Architect the precise locations and types of trim to be used.

2. Provide metal trim at all junctures of gypsum wallboard and dissimilar materials.
3. Carefully inspect the drawings and verify location of all metal trim required.
4. Install all trim in strict accordance with the manufacturer's recommendations, paying particular attention to make all trim installation plumb, level, and true-to-line with firm attachment to supporting members.

E. Grillages: Spacing of furring channels and runner channels, and the spacing and spans of runners shall not exceed the limits given for each shape in the "Metal Lath Association Specifications".

1. Running channels shall be spaced not over 3 feet on center and spans shall not exceed 4 feet (2 feet at light fixtures).
2. Suspend running channels directly from structure with 12 gauge hanger wire.
3. Cross furring channels shall be spaced not over 13-1/2" on center.
4. Hangers shall be spaced as specified above and within 6" of the ends of main runner runs and of boundary walls,girders, or similar interruptions of ceiling continuity. Main runner shall be properly positioned and leveled, and hangers shall be saddle tied along runner. Main runners shall not be let into nor come in contact with abutting masonry walls. Runner channels shall be located within 6" of the walls to channels shall be securely saddle tied with two strands of 16 gauge tie wire to main runners and shall not be let into or come in contact with abutting masonry walls. All openings shall be formed with carrying channels. All offsets and isolated areas shall be securely braced against sway.

3.03 ADJUST AND REPAIR

A. "Nail Pop":

1. When face paper is punctured, drive new screw approximately 1-1/2" (38mm) from defective fastening and remove defective fastening.
2. Fill damaged surface with compound.

B. Ridging:

1. Do not repair ridging until condition has fully developed - approximately 6 months after installation or one heating season.
2. Sand ridges to reinforcing tape without cutting through tape.
3. Fill concave areas on both sides of ridge with topping compound.
4. After fill is dry, blend in topping compound over repaired area.

C. Cracks:

1. Fill cracks with compound and finish smooth and flush.

END OF SECTION 09 21 16

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PART 1 -GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system and perimeter trim.

B. Acoustical tile and panels.

C. Non-fire rated assembly.

D. Supplementary acoustical insulation over system units.

1.02 REFERENCES

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E580 - Practice for Application of Ceiling Suspended Systems for Acoustical Tile and Lay-in panels in areas requiring seismic restraint.

D. ASTM E1264 - Classification of Acoustical Ceiling Products.

E. Ceilings and Interior Systems Contractors Association (CISCA) - Acoustical Ceilings: Use and Practice.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 32 00.

B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finished, interrelation of mechanical and electrical items related to system and wall layouts.

C. Product Data: Provide data on metal grid system components, acoustical units and accessories.

D. Samples: Submit two samples full size illustrating material and finish of acoustical units.

E. Samples: Submit two samples each, 12 inches (300 mm) long, of suspension system main runner, cross runner, edge trim, and hold down clips.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

A. Grid Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for combustibility requirements for materials.

1.06 ENVIRONMENTAL REQUIREMENTS

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

1.07 SEQUENCING

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

A. Furnish under provisions of Section 01 77 00.

B. Provide 10 percent of total acoustical unit area of extra tile panels to Owner.

PART 2 – PRODUCTS

2.01 MANUFACTURERS - SUSPENSION SYSTEM

A. Chicago Metallic Corp.

B. Armstrong Contract Interiors.

C. Donn by U.S.G. Interiors, Inc.

2.02 SUSPENSION SYSTEM MATERIALS

A. Non-fire Rated Grid: ASTM C635, heavy duty; exposed T as indicated: components die cut and interlocking.

B. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

C. Exposed Grid Surface Width: 15/16 inch (24 mm).

D. Grid Finish: White and color as indicated.

E. Accessories: Stabilizer bars clips splices edge moldings hold down clips and for suspended grid system.

F. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, a ceiling system flatness requirement specified.

2.03 MANUFACTURERS - ACOUSTICAL UNITS

A. U.S.G. Interiors, Inc. Product as schedule.

B. Armstrong Contract Interiors Product as scheduled.

C. Celotex Building Products Product as scheduled.

2.04 ACOUSTICAL UNIT MATERIALS

A. Armstrong Type 737

1. Recessed Angular Tegular
2. Size: 24" x 24" x 5/8"
3. Grid: 15/16" DX
4. Color: White

2.05 ACCESSORIES

A. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - LAY IN GRID SUSPENSION SYSTEM

A. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section.

B. Install system in accordance with ASTM E580.

C. Install system capable of supporting imposed loads to a deflection of 1/240 maximum.

D. Lay out system as indicated on reflected ceiling plans.

E. Supply hangers or inserts for installation with instructions for their correct placement.

F. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches (150 mm) of each corner; and support components independently.

K. Do not eccentrically load system, or produce rotation of runners.

L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

M. Form expansion joints as required. Maintain visual closure.

3.03 INSTALLATION - CONCEALED GRID SUSPENSION SYSTEM

A. Install suspension system in accordance with manufacturer's instructions and as supplemented in this section.

B. Install system in accordance with ASTM E580.

C. Install system capable of supporting imposed loads to a deflection of 1/240 maximum.

D. Lay out system to a balanced grid design as indicated on reflected ceiling plans and/or electrical lighting plans.

E. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

F. Supply hangers or inserts for installation with instructions for their correct placement.

G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located with 6 inches (150 mm) of each corner; and support components independently.

K. Do not eccentrically load system, or produce rotation of runners.

L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

M. Form expansion joints as required. Maintain visual closure.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.

D. Install units after above ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.

F. Cut tile panels to fit irregular grid and perimeter edge trim. Field rabbett tile panel edge. Double cut and field paint exposed edges of tegular units.

G. Where bullnose concrete block corners round obstructions occur, provide preformed closers to match edge molding.

H. Lay acoustical insulation for a distance of 48 inches (1 200 mm) either side of acoustical partitions.

I. Install hold-down clips to retain panels tight to grid system within 20 ft (6 m) of an exterior door.

3.05 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09 51 13

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes resilient wall base and flooring accessories.

B. See Division 09 Sections “Resilient Tile Flooring”.

1.02 SUBMITTALS

A. Product Data: For each product indicated.

B. Below assumes manufacturer's standard-size Samples are acceptable. Revise to suit Project.

C. Samples: For each product and for each color, pattern, and texture required.

1.03 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient accessories for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods.

B. After installation, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient accessories after other finishing operations, including painting, have been completed.

1.04 EXTRA MATERIALS

A. Extra materials may not be allowed for publicly funded projects.

B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Furnish not less than 10 linear feet (3 linear m) of each different type, color, pattern, and size of resilient product installed.

PART 2 – PRODUCTS

2.01 WALL BASE

A. See "Listed Manufacturers" Article in the Evaluations for cautions about naming manufacturers and products.

B. Retain above for nonproprietary or below for semiproprietary specification. Refer to Division 01 Section "Product Requirements."

C. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.

2. Roppe Corporation.

3. Johnsonite, Division of Duramax, Inc.

4. Others as approved equal.

D. For proprietary or semiproprietary specification, delete descriptive wall base requirements below that are determined by product designations inserted above.

E. Wall Base: Rubber, FS SS-W-40, Type I.

1. Color and Pattern: As selected from manufacturer's full range.

2. Style: Cove with top-set toe

3. Minimum Thickness: 1/8 inch

4. Height: 6 inches
5. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet
6. Outside Corners: Job formed.
7. Inside Corners: Job formed.
8. Surface: Smooth.

2.02 RESILIENT ACCESSORY MOLDING

A. See "Listed Manufacturers" Article in the Evaluations for cautions about naming manufacturers and products.

B. Retain above for nonproprietary or below for semiproprietary specification. Refer to Division 01 Section "Product Requirements."

C. Products: Subject to compliance with requirements, provide one of the following:

1. Johnsonite, Division of Duramax, Inc.
2. Roppe Corporation.
3. Others as approved equal.

D. For proprietary or semiproprietary specification, delete descriptive requirements below that are determined by product designations inserted above.

E. Description: Carpet edge for glue-down applications, reducer strip for resilient flooring.

1. Material: Rubber.
2. Color: As selected from manufacturer's full range.
3. Profile and Dimensions: as required for application.

2.03 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement-based or blended hydraulic cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Before installing resilient wall base and accessories:

1. Remove coatings, including curing compounds, 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.
2. Move resilient products and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer. Install products only after they are at the same temperature as the space where they are to be installed.

B. Use trowelable leveling and patching compounds to fill cracks, holes, and depressions in substrates.

1. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

2. Adhesively install resilient wall base and accessories. Place resilient products so they are butted to adjacent materials.
3. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
4. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
5. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
6. Do not stretch base during installation.
7. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
8. Form outside corners on job, from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
9. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.
10. Install reducer strips at edges of flooring that otherwise would leave exposed edges.
    a. At doors, install reducer strips to be hidden by the closed door.
11. Immediately after installing resilient products, remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.

END OF SECTION 09 65 13

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Carpet squares with adhesive back.

B. Accessories

1.02 REFERENCES

A. ASTM D2859 - Test method for flammability of finished textile floor covering materials.

B. ASTM E84 - Surface burning characteristics of building materials.

C. ASTM E648 - Critical Radiant flux of floor covering systems using a radiant heat energy source.

D. NFPA 253 - Test for critical radiant flux of floor covering systems.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 32 00.

B. Shop Drawings: Indicate seeming plan, method of joining seams, direction of carpet.

C. Product Data; Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation, and layout of flat wire system.

D. Samples: Submit two samples 18 x 18 inch (450 x 450 mm) in size illustrating color and pattern for each carpet material specified.

E. Submit two, 12 inch (300 mm) long samples of edge strip, material for each color specified.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing specified carpet with minimum three years documented experience.

B. Installer: Company specializing in installing carpet with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/smoke rating requirements in accordance with ASTM E84.

B. Conform to NFPA 253, ASTM E648, Class I for flooring radiant panel test.

C. Conform to ASTM D2859 for surface flammability ignition test.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.

B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 3 days prior to, during and 24 hours after installation.

1.07 MAINTENANCE DATA

A. Submit under provisions of Section 01 77 00.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.08 EXTRA MATERIAL

A. Furnish under provisions of Section 01 77 00.

B. Provide 10% extra of carpet squares, but not less than 8, of each type, color, and pattern specified.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – CARPET SQUARES

A. Mohawk

B. Shaw

C. Milliken

D. All others must submit for approval

2.02 MATERIALS - CARPET

A. Refer to the Room Finish Schedule for Carpet Material for this Project

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. “Pressure Sensitive Adhesive” designed for use with carpet squares

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of ¼ inch in 10 ft. (6 mm in 3 m), and are ready to receive work.

B. Verify concrete floors are dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

3.02 PREPARATION

A. Vacuum clean substrate.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Prime any patched areas, dirty, dusty or porous floors with a latex milk additive such as Parachem 615 or 620.

3.03 ADHESIVE APPLICATION

A. Adhesive must be used in a full spread application

B. Apply with a 1/16 x 1/16 x 1/16 square notched trowel. Do not apply with a paint roller.

C. Allow adhesive to dry to a clear and tacky state before laying carpet squares.

3.04 INSTALLATION

A. Install carpet squares per Manufacturer’s instructions.

B. Install tiles immediately after adhesive has dried

C. Lay carpet squares tight and flat on subfloor.

D. Fit carpet squares tight to intersection with vertical surfaces without gaps.

E. Where wall bases are scheduled, cut carpet squares tight to walls.

F. Fit carpet squares tight to vertical surfaces to form base.

G. Carpet squares shall be installed in a quarter turn configuration.

3.05 CLEANING

A. Clean work under provisions of 01 77 00.

B. Remove excess adhesives without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

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END OF SECTION 09 68 13

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Carpet placed with glue down method.

B. Accessories

1.02 REFERENCES

A. ASTM D2859 - Test method for flammability of finished textile floor covering materials.

B. ASTM E84 - Surface burning characteristics of building materials.

C. ASTM E648 - Critical Radiant flux of floor covering systems using a radiant heat energy source.

D. NFPA 253 - Test for critical radiant flux of floor covering systems.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 32 00.

B. Shop Drawings: Indicate seeming plan, method of joining seams, direction of carpet.

C. Product Data; Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation, and layout of flat wire system.

D. Samples: Submit two samples 18 x 18 inch (450 x 450 mm) in size illustrating color and pattern for each carpet material specified.

E. Submit two, 12 inch (300 mm) long samples of edge strip, material for each color specified.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing specified carpet with minimum three years documented experience.

B. Installer: Company specializing in installing carpet with minimum three years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/smoke rating requirements in accordance with ASTM E84.

B. Conform to NFPA 253, ASTM E648, Class I for flooring radiant panel test.

C. Conform to ASTM D2859 for surface flammability ignition test.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.

B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 3 days prior to, during and 24 hours after installation.

1.07 MAINTENANCE DATA

A. Submit under provisions of Section 017700.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.08 EXTRA MATERIAL

A. Furnish under provisions of Section 01 77 00.

B. Provide 300 sq. ft. (27 sq m) of carpeting of each type, color, and pattern specified.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - CARPETING

A. Mohawk Trax

1. Product Type – Broadloom
2. Construction - Ultra Performance System RE
3. Surface Appearance - Textured Patterned Loop
4. Nylon Type - Colorstrand® SD Nylon
5. Gauge - 1/10 (39.37 rows per 10 cm)
6. Pile Weight - 28.0 oz. per sq. yd. (949 g/m2)
7. Pile Thickness - .162 (4.11 mm)
8. Stitches Per Inch - 11.0 (43.31 per 10 cm)
9. Dye Method - Solution Dyed
10. Protective Treatment - Sentry Plus
11. Density - 6,222
12. Weight Density - 174,216
13. Primary Backing - Not Applicable
14. Backing Foundation - Composite Foundation
15. Secondary Backing – None
16. Pattern Repeat - 80" (W) x .72" (L)
17. Width - 12' (3.66 m)
18. Flammability - ASTM E 648 Class 1 (Glue Down)
19. Smoke Density - ASTM E 662 Less than 450
20. Static Propensity - AATCC-134 Under 3.5 KV
21. IAQ Green Label – 40904952
22. Warranties - Lifetime Ultra Performance System Warranty, Lifetime Limited Colorfastness to Light, 10 Year Limited Colorfastness to Atmospheric Contaminants, 10 Year Stain Warranty, Lifetime Static

B. All others must submit for approval.

2.02 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Adhesive: Compatible with carpet material. Recommended by carpet manufacturer.

C. Edge Strips: Non-metallic type, color as selected. Manufactured by Johnsonite.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are smooth and flat with maximum variation of /14 inch in 10 ft. (6 mm in 3 m), and are ready to receive work.

B. Verify concrete floors are dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.03 INSTALLATION

A. Apply carpet and adhesive in accordance with manufacturer's instructions.

B. Verify carpet match before cutting to ensure minimum variation between dye lots.

C. Double cut carpet, to allow intended seam and pattern match. Make cuts straight, true, and unfrayed.

D. Locate seams in area of least traffic.

E. Joint seams by hot adhesive tape or cementing method. Form seams straight, not overlapped or peaked, and free of gaps.

F. Lay carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance. Provide monolithic color, pattern, and texture match within any one area.

G. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.

H. Cut and fit carpet around interruptions.

I. Bind cut edges where not concealed by edge strips.

J. Fit carpet tight to intersection with vertical surfaces without gaps.

K. Where wall bases are scheduled, cut carpet tight to walls. Fit carpet tight to vertical surfaces to form base. Terminate top of base gripper cap strip.

3.04 CLEANING

A. Clean work under provisions of 01 77 00.

B. Remove excess adhesives without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

3.05 SCHEDULE

A. See Room Finish Schedule.

END OF SECTION 09 68 16

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PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Includes But Not Limited To-

1. Finishing elements of the building shown on attached Finish Schedule or specified below.
2. Back prime work to be installed against concrete or masonry or subjected to moisture.
3. Paint mechanical and electrical items located in classrooms as determined by Owner.

B. The type of material to be used and the number of coats to be applied are listed in the Part 2 of this Section or as noted on the Drawings.

C. Prepare and paint or finish surfaces as hereinafter described, including, but not limited to the following:
1. Concrete Unit Masonry
2. Gypsum plaster
3. Cement plaster
4. Wood doors, finish wood carpentry, and trim
5. Hollow metal doors, frames

D. Other exposed surfaces that are not specifically indicated to be factory finished or finished by others.

E. It is the intent of this Specification to require all existing painted wall surfaces, except those explicitly exempted herein, to be painted under this contract.

F. Related Documents-

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Section in Division 01, General Requirements, of these Specifications.

1.02 SUBMITTALS

A. Product Data-

1. Written list of specific products proposed along with Manufacturer's certification that products meet specified requirements. Before any paint materials are delivered to the job site, submit to the Architect in accordance with the provisions of Section 01 32 00 of these specifications a complete list of all materials proposed to be furnished and installed under this portion of the work.
   a. Data shall be specific as to Manufacturer's brand name and identifying numbers.
   b. Samples: Accompanying the materials list, submit to the Architect two copies of the full range colors available in each of the proposed products.
   c. Indicate square footage to be covered by each product, Manufacturer's recommended coverage rates, and amount of product required based on average coverage.
   d. Indicate items to be finished as work of each painting Section.
   e. Outline, preparation and application procedures to be followed including application methods, time between coats, and environment
   f. Provide Manufacturer's cut sheets which indicate paint components. As a minimum, specification requirements for paint composition shall be given on cut sheets submitted.
2. Color selection data.
3. Maintenance instructions.

B. Samples-

1. Provide paint card for each color and for each paint system. Card to show each component of system as well as total system.

1.03 QUALITY ASSURANCE

A. Pre-installation Meeting-

1. Schedule meeting after delivery of paint but prior to application of field samples or paint.

B. Field Samples-

1. Prior to application of any paint system meet on Project site with Owner's representative. Owner may select one surface for application of each paint system specified.

2. Apply paint systems to surfaces indicated following procedures outlined in Contract Documents and Product Data submission specified above.

3. After approval of samples, proceed with application of paint system throughout Project.

C. Applicator shall have experience in application of specified products for five years minimum and be acceptable to Owner and Manufacturer.

1.04 DELIVERY, STORAGE, & HANDLING

A. Deliver specified products in original containers with labels intact on each container. Deliver amount of material indicated on submittal for Project in single shipment. Notify Owner two working days prior to delivery.

B. Store materials in single place.

C. Keep storage area clean and rectify any damage to area at completion of work of this Section.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Conditions-

1. Maintain temperature of paint storage area at 55 deg. F minimum.

2. Perform painting operations at temperature conditions recommended by Manufacturer for each operation.

1.06 SCHEDULING

A. Coordinate by room painting schedules with Owner.

B. Examine Contract Documents for painting requirements of other trades. Become familiar with their painting provisions and the painting of finish surfaces left unfinished by the requirements of other Sections.

C. Contractor may work in facilities during normal hours of 6 a.m. to 6 p.m., or with approval of Owner after 6 p.m.

1.07 MAINTENANCE

A. Extra Materials-

1. Provide one gallon of each finish coat material in Manufacturer's original container in each color used. Provide one gallon of each primer and of each undercoat in each color used.

2. The paint containers shall be clearly identified with the paint color number and name.

PART TWO – PRODUCTS

2.01 MATERIALS

A. Manufacturer

1. All paint materials selected for coating systems for each type of surface shall be the product of a single manufacturer.

2. Primers shall be by the same manufacturer as the paint used for the final coats and shall be of the type recommended by that manufacturer for the particular application.

3. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

B. Standards:

1. Sherwin-Williams
2. M.A.B.
3. Porter Paint
4. Devoe Paint

C. Linseed oil, shellac, turpentine, and other painting materials shall be pure, of highest quality, and bear identifying labels on containers.

D. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

E. Paint compositions shall not only meet specified requirements but also contain sufficient miscellaneous components to promote proper drying and performance during and after application.

2.02 GUIDE TO APPROVED PRODUCTS

A. General: The following list of manufacturers and products is approved by the Architect for use on the project. Such a list shall serve as a guide to the quality of the types of materials to be used and shall not be construed as a basis for limiting competition.

B. Materials list:

1. Metal Primer:
   a. Sherwin-Williams - Kemk Kromik Metal Primer
   b. Or equal
2. Metal Finish coat:
   a. Sherwin-Williams - Pro-Mar Alkyd
   b. Or equal
3. Latex Wall and Ceiling Primer:
   a. Sherwin-Williams - Pro-Mar Latex Wall Primer
   b. Or equal
4. Semi-Gloss Finish:
   a. Sherwin-Williams - Style Perfect Latex Semi-Gloss Enamel
   b. Or equal
5. Flat Finish:
   a. Sherwin-Williams - Pro-Mar 400 Latex Wall
   b. Or equal
6. Wood Varnish:
   a. Sherwin-Williams - S-W Oil Base Gloss Varnish
   b. Sherwin-Williams - S-W Oil Base Satin Finish
   c. Or equal

7. Wood Stain Interior:
    a. Sherwin-Williams - S-W Interior Wood Stain
    b. Or equal
8. Paste Filler:
    a. Sherwin-Williams - S-W Paste Wood Filler
    b. Or equal
9. Galvanized Metal Primer:
    a. Sherwin-Williams - S-W Galvanized Iron Primer
    b. Or equal
10. Galvanized Metal Finish Coat:
    a. Sherwin-Williams - Pro-Mar Alkyd Semi-Gloss Enamel
    b. Or equal

C. Finish color as Scheduled or selected by Owner

PART THREE – EXECUTION

3.01 INSPECTION

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. Verify that paint finishes may be applied in strict accordance with all pertinent codes and regulations and the requirements of these specifications is complete to the point where this installation may properly commence.

C. Prior to installation of work of this Section, inspect spaces to verify that spaces are ready for commencing painting.

D. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

E. If inspection reveals deficiencies in work areas such that painting cannot be successfully completed, for not proceed with work of this Section in area of deficiency until resolved.

F. Starting painting work will be construed as acceptance of surfaces and conditions within any particular area.

3.02 PREPARATION OF SURFACES, GENERAL

A. Protection: Prior to all surface preparation and painting operations, completely mask, remove, or otherwise adequately protect all hardware, accessories, machined surfaces, nameplates, U.L. labels lighting fixtures, and similar items in contact with painted surfaces but not scheduled to receive paint.

B. Smoothing: Unless specifically noted to be left rough, smooth all finished wood surfaces exposed to view, using the proper sandpaper.

C. Dryness: Unless specifically approved by the Architect, do not proceed with the painting of wood surfaces until the moisture content of the wood is 12% or less.

D. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.

E. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting.

F. Apply barrier coats over incompatible primers.

G. Remove hardware, electrical device covers, lighting fixtures, and similar in place work or provide surface applied protection prior to surface preparation and painting. After completion of painting, reinstall any removed work.

H. Fill holes and cracks in surfaces to receive paint or stain.

3.03 PREPARATION OF METAL SURFACES

A. Galvanized Metal:

1. Clean all surfaces thoroughly with solvent until they are completely free from dirt, oil, and grease.
2. Thoroughly treat the cleaned surface with phosphoric acid etch.
3. Remove all excess etching solution and allow to dry completely before application of paint.

B. Other Metals:

1. Thoroughly clean all surfaces until they are completely free from rust, dirt, oil, and grease.
2. Allow to dry thoroughly before application of paint.

3.04 PREPARATION OF GYPSUM DRYWALL

A. Remove dirt, dust, and other foreign matter. Smooth all apparent deposits of spackling compound, taking care not to damage the paper cover of the gypsum drywall.

3.05 PREPARATION OF WOOD SURFACES

A. Cleaning: Clean all wood surfaces until they are free from dirt, oil, and all other foreign substance.

B. Knots:

1. On small, dry, seasoned knots, thoroughly scrape and clean the surface and apply one coat of good quality knot-sealer before application of the priming coat.
2. On large, open, unseasoned knots, scrape off all pitch and thoroughly clean the area, followed by an application of one coat of good quality knot-sealer.
3. Remove and treat all pitch surface as required for large knots.

C. Dryness: Unless specifically approved by the Architect, do not proceed with the painting of wood surfaces until the moisture content of the wood is 12% or less.

3.06 PREPARATION OF MASONRY SURFACES

A. Cleaning: Cleaning all masonry surfaces until they are free from dirt, oil, and all other foreign substances.

B. Spot prime existing masonry as required for complete coating.

3.07 PAINT APPLICATION

A. General:

1. Paint all surfaces except glass, copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
2. and similar items not finished and not called out for as unfinished.
3. Paint all grilles and other pre-finished items where the factory finish is not in accordance with the "Painting Schedule".
4. Carefully follow Specifications and color schedule, painting complete all surfaces to be painted.
5. Spread materials smoothly and evenly.

6. Putty nail holes in wood after application of first finish coat using natural colored type to match wood finish. Bring putty flush with adjoining surfaces.
7. Finished work shall be uniform, of approved color, smooth, and free from runs, sags, defective brushing, rolling, clogging, and excessive flooding.
8. Read color schedule for rooms before priming walls. Tint priming coat and undercoat to approximate shade of final coat, but with enough difference so it is possible to check application of specified number of coats.
9. Touch up suction spots after application of first coat.
10. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
11. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
12. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
13. All painting of mechanical piping shall be by the Mechanical Prime Contractor.

B. Drying:
1. Allow sufficient drying time between coats.
2. Modify the periods as recommended by the material manufacturer to suit adverse weather conditions.
3. Oil-base and oleo-resinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Environmental Conditions:
1. Comply with the Manufacturers recommendations as to environmental conditions under which the coating systems may be applied.
2. Do not apply paint in areas where dust is being generated.

D. Moisture Content:
1. Use a moisture meter approved by the Architect to test surfaces.
2. Do not apply the initial coating until moisture meter reading is within limits recommended by the paint materials manufacturer.

E. Defects: Sand and dust between coats to remove all defects visible to the unaided eye from a distance of five feet.

F. Color of undercoats: Slightly vary the color of succeeding coats.

3.08 INSPECTION

A. General: Do not apply additional coat until completed coat has been inspected and approved by the Architect.

B. Number of coats: Only inspected and approved coats of paint will be considered in determining the number of coats applied.

3.09 ADJUSTMENT

A. At completion of Project, touch up work to match specified finish. Repaint are damaged during construction with specified finish at no additional cost to Owner.

3.09 CLEANING UP

A. General:

1. During progress of the work, do not allow the accumulation of empty containers or other excess items except in areas specifically set aside for that purpose.

2. Remove all oily rags and waste from building each night. Take every precaution to avoid danger of fire.

3. Prevent accidental spilling of paint materials and, in event of such spill, immediately remove all spilled material and the waste or other equipment used to clean up the spill, and wash the surfaces to their original undamaged condition, all at no additional cost to the Owner.

B. Prior to final inspection: Upon completion of this portion of the work, visually inspect all surfaces and remove all paint and traces of paint from surfaces not scheduled to be painted.

C. Upon completion of work of this Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition. Remove debris caused by work of this Section from premises.

END OF SECTION 099010

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PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Cabinets and counter tops.

B. Casework hardware.

1.02 REFERENCES

A. Countertop Standard: ANSI A161.2

B. Catalog Standards: Manufacturer's catalog numbers may be shown on drawings or in equipment schedule for convenience in identifying certain cabinet work. Unless modified by notation on drawings or otherwise specified, catalog description for indicated number constitutes requirements for each such cabinet.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 32 00.

B. Shop Drawings: Indicate casework locations, large scale plans, elevations, rough-in and anchor placement dimensions and tolerances, clearances required.

C. Product Data: Provide component dimensions, configurations, construction details and joint details.

D. Samples: Submit two samples, minimum size 3 x 6 inches (75 x 150 mm) of each color of finish.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI 161.1.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Stevens Cabinet Company, Inc. Product Architectural Designer Series.

B. L.S.I. Corp. of America, Inc.

C. Trimline Product.

D. Custom fabricated per enclosed specifications.

E. Or approved equal

2.02 BASIC MATERIALS

A. Particleboard: ANSI A208.1 mat. formed particleboard, Grade 1-M- with minimum density of 40 lbs. per cu. ft., internal bond of 60 psi; and minimum screw holding capacity of 225 lbs. on faces and 200 lbs. on edges.

B. Plastic Laminate: NEMA LD-3, of thickness, type and grade designation indicated; in colors or patterns and finishes indicated or, if not indicated, as selected by Architect from manufacturer's standard range.

C. Exposed Surfacing Material of Doors, Drawer Fronts, Fixed Panels, Toeboards and Ends: High pressure decorative laminate, 0.028" thick, General Purpose Type (GP-28).

D. Semi-Exposed Surfacing Material and Doors: High pressure plastic laminate, 0.020" thick, Cabinet Liner Type (CL-20), in color or pattern and finish matching interior of cabinets, unless otherwise indicated.

E. Remaining Semi-Exposed Materials: Decorative boards, General Purpose type, conforming to NEMA LQ-1 with decorative faces in patterns or colors and finish indicated or, if not indicated, as selected by Architect from manufacturer's standard range.

F. Concealed Materials: Any sound dry solid lumber, plywood or particleboard or combination thereof; without defects affecting strength, utility or stability. On concealed surfaces of portions constructed of decorative boards, provide decorative or cabinet liner laminate backing (Light-Duty Type).

G. Core Material for Plastic Laminates: Industrial Grade Particleboard conforming to ANSI A20B.1, Grade 1-M-2.

H. Treatment of Exposed and Semi-Exposed Edges: Edges of doors and drawer fronts shall have GP-28 plastic laminate to match fronts.

I. Cabinet Construction

1. Sides, dividers, tops, bottoms, shelves and stretchers: Not less than 1/2" thick. Provide stretchers at top of base cabinet.

2. Backs: Not less than 3/8" thick for unexposed backs. Exposed backs are to be 3/4" thick panels of balanced construction tenoned into cabinet ends.

3. Drawers

   a. Sides, subfronts and backs: not less than1/2" thick.

   b. bottoms: not less than 1/4" thick particleboard or provide solid wood sides and back.

   c. Provide box type construction with front, bottom and back rabbeted in sides.

   d. All joints secured with glue and mechanical fasteners.

   e. All drawers must be suspended on extension drawer slides.

4. Joinery

   a. Rabbet backs flush into end panels and secure with concealed mechanical fasteners.

   b. Connect wall cabinet tops and bottoms and base cabinet bottoms and stretchers to ends and dividers by means of mechanical fasteners.

   c. Rabbet tops, bottom and backs into end panels or cabinetry corner joints to incorporate fluted dowel pin construction.

5. Subbase: Not less than 3/4" thick, of height and relationship to cabinet fronts and exposed ends as indicated. Rubber base furnished and applied continuously per Section 09650.

6. Toe Board: Not less than 3/4" thick, attached to subbase with concealed fasteners.

2.03 COUNTERTOPS

A. Exposed Surfacing Material: High pressure plastic laminate, 0.050" thick, General Purpose Type (GP-50); except 0.042" thick, Postforming Type (PF-42), where postformed coutertop configuration is indicated.

B. Substrate (Core) for Exposed Surfacing Material: Partcleboard.

C. Countertop Configuration: Provide self-edge countertops with continuous 4" backsplash.

D. Countertop Thickness: As indicated or, if not indicated, not less than 1-1/4" thick, and unless otherwise indicated, with substrate (core) not less than 3/4" thick.

2.04 CABINET AND CASEWORK HARDWARE AND ACCESSORIES

A. General: Provide manufacturer's standard hardware and accessory units of type, size and finish indicated, complying with ANSI A156.9 or, if not indicated, as selected by Architect from manufacturer's standard range.

B. Hinge: Institutional type, 5 knuckle with 270 degree swing. Provide one pair for doors less than 4 ft. high and 1-1/2 pair for doors over 4 ft.

C. Pulls: Selected from manufacturer's standard. Provide 2 pulls for drawers over 24" wide.

D. Door Catches: Nylon roller spring catch or dual self-aligning permanent magnet type. Provide 2 catches on doors over 4 ft. high.

E. Drawer Slides: Steel slides with ballbearing nylon rollers. 100# rating. File drawers shall have full extension drawer slides for full access to drawer.

F. Drawer and Cupboard Locks: Half-mortise type, 5-disc tumbler and dead bolt, round cylinder only exposed, die cast with plated finish.

1. Key each cabinet in room alike.
2. Key each room differently.
3. Provide one master key.
4. Provide two keys each.

G. Sliding Door Hardware Sets: Manufacturer's standard to suit type and size of sliding door units.

H. Shelf Support Clips: One-piece molded nylon.

I. Sinks and Faucets: As specified in Division 22.

J. Finish: Unless otherwise indicated, provide hardware units with manufacturer's standard, satin finish.

2.05 FABRICATION

A. Shop assemble casework for delivery to site in unit easily handled and to permit passage through building openings.

B. Fabricate corners and joints without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.

C. Fabricate each unit rigid, not dependent on building structure adjacent units for rigidity.

D. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

E. Form edges smooth. Form material for counter tops, facing, shelves, and linings from continuous sheets.

F. Provide cutouts for plumbing fixtures, appliances, fixtures and fittings. Prime paint contact surfaces of cut edges.

G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 FINISHES

A. Exposed To View Surfaces: Plastic Laminate of color and pattern as selected.

B. Interior Surfaces: Plastic Laminate of color and pattern as selected.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify existing conditions.

B. Verify adequacy of support framing.

3.02 INSTALLATION

A. Install casework, components and accessories in accordance with manufacturer's instruction.

B. Use anchoring devices to suit conditions and substrate materials encountered.

C. Set casework items plumb and square, securely anchored to building structure.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Use fuller strips not additional overlay trim for this purpose.

E. Close ends of units, back splashes, shelves and bases.

F. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3.03 ADJUSTING

A. Adjust work under provisions of Section 01 77 00.

B. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.04 CLEANING

A. Clean work under provisions of 01 77 00.

B. Clean casework, counters, shelves and hardware.

3.05 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 77 00.

B. Do not permit finished casework to be exposed to continued construction activity.

3.06 SCHEDULES

A. See Plans and Details.

END OF SECTION 12 32 16

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes, but is not limited to, following basic provisions, materials, and methods common to various mechanical work, to complement other Division 23 Sections and govern respective Division 23 work, where applicable, the same as if repeated in respective Sections:

1. Quality Assurance requirements.
2. Equipment Selection requirements.
3. Delivery, Storage, and Handling requirements.
4. Sequencing and Scheduling requirements.
5. Method of listing and referencing Acceptable Manufacturers.
6. No shrink grout for equipment installations.
7. Rough-In and Installation requirements common to equipment and systems.
8. Field-fabrication of metal and wood equipment supports.
9. Cutting and patching requirements.
10. Fire stopping coordination requirements (Complement to Division 07) and/or NFPA.

B. Other basic mechanical materials and methods which complement this Section and govern respective Division 23 work are specified in respective complementary Sections immediately following this Section and in Sections designated "General". Refer to Project Manual "Table of Contents" for respective Section numbers and titles.

C. Particular products and systems are specified in respective Sections. Refer to Project Manual "Table of Contents" for respective Section numbers and titles.

1.02 DEFINITIONS

A. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

B. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

C. Exposed Exterior Installations: Exposed to view outdoors and subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations, outdoors on grade, attached to exterior building walls etc.

D. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

E. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

F. Installer: Respective tradesperson or subcontractor responsible for respective work.

G. Supplier: Respective manufacturer or his authorized distributor or representative.

1.03 SUBMITTALS, GENERAL

A. Submit prescribed submittal items for materials and products to be installed on this Project, when requested and as called for in respective Section or on Drawings and when space or sequencing coordination is required.

1.04 QUALITY ASSURANCE, GENERAL

A. Quality assurance requirements for mechanical work are included in "Quality Assurance, Basic Provisions"and complimented for particular work in respective product and system Sections.

B. Prior to ordering and rough-in, coordinate mounting, fit, trim, etc., of respective furnished items with design and construction of adjoining equipment and construction. Take special care to coordinate design of trim, flanges, attachments, etc., with related construction.

1.05 EQUIPMENT SELECTION AND SUITABILITY

A. Following provisions complement requirements of respective Sections in Division 1 which govern material and equipment selection.

B. Product Substitutions: Governed by "Substitutions" in "Instructions to Bidders". Burden of proof of equality of products is on the Contractor.

C. Drawings indicate capacities, sizes, and dimensional requirements of system components. Equipment, specialties, and accessories are based on specific types, manufacturers, and models indicated. Components having equal performance characteristics that deviate from indicated size and dimensions may be considered provided deviations do not change the design concept or intended performance as judged by A/E/D.

D. Mention of a specific product, by name or model number, in Contract Documents does not negate requirements for that particular product to meet physical and performance criteria set forth in the Contract Documents.

1. References to specific products are to establish general design and a level of quality.

2. Furnished products shall possess all required features and be coordinated with conditions affecting the work.

3. Actual rough-in and connection requirements and locations for referenced items may not be the same as the typical arrangements represented on Drawings. Equipment rough-in and connections are subject to manufacturer's standards for items furnished. Piping, conduit, wiring, etc., shall be coordinated with furnished products and installed accordingly, without added cost to Owner.

D. Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical facilities (services, circuit breakers, conduit, motors, bases, equipment spaces, etc.) are increased. No additional costs will be approved for these increases, if larger equipment is approved. If equipment minimum energy ratings or efficiencies are specified, furnished equipment must meet specified design requirements and commissioning requirements.

1.06 DELIVERY, STORAGE, AND HANDLING, GENERAL

A. Deliver products to site and properly store and protect under applicable provisions of Division One, requirements herein, and requirements in respective product and system Sections.

1. Properly identify products on outside of container with names, model numbers, types, grades, compliance labels, and other information needed for identification. Include project name, drawing reference designation, room number, etc. to aid distribution at job site.

B. Schedule deliveries, coordinated with construction progress, so that materials will be available when needed. When possible, schedule deliveries of large equipment items for a time when respective items can be moved directly into installation location from delivery vehicle, thereby avoiding storage on site.

C. Handle products, components, and accessories carefully to prevent damage. Comply with respective manufacturer's rigging and installation instructions for unloading and moving products. Do not install damaged items; replace with new.

D. Store products in original container, protective wrap, etc. and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with weatherproof wrapping.

1.07 SEQUENCING AND SCHEDULING, GENERAL

A. Coordinate installation of mechanical equipment, materials, and systems with other building components and construction progress.

B. Arrange for chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

C. Coordinate respective installation provisions, as applicable:

1. Sleeves and inserts in poured-in-place concrete, etc.

2. Layout of supports and roof penetrations for roof mounted work.

3. Size and location of concrete equipment bases.

4. Rough-in of piping and electrical provisions for equipment.

E. Sequence, coordinate, and integrate installation of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

F. Coordinate connection of mechanical systems with exterior utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

PART 2 – PRODUCTS

2.01 MANUFACTURERS, GENERAL

A. Subject to compliance and requirements, manufacturers offering products that may be incorporated in the work including but not limited to manufacturers included in respective Contract Documents in one of the following forms:

1. Named (Referenced) Products: Where proprietary names, names of particular manufacturers or vendors and catalog/model numbers, etc. are referenced in Specifications, on Drawings, etc.; specific item referenced shall be understood as establishing general type, function, approximate dimensions, appearance, and quality desired. Products furnished shall be configured and equipped, with alterations when and as required, to provide all features and functions specified or shown and to conform to all conditions effecting incorporation of the product into the work.

a. Actual manufacturer's ordering numbers denoting configuration, features, capacities, etc. specified or required shall be determined by Contractor and supplier, through comparison of respective manufacturer's specifications and options with Project Specifications and Drawings (schedules, notes, details, etc.), job conditions, and applicable codes and regulations.

2. Listed (Acceptable) Manufacturers: Manufacturers listed as "acceptable" in specifications are believed to have the ability to manufacture products which are equivalent to the product described and referenced (named) in respective Specifications or on Drawings. Contractor has the option to furnish products that are manufactured by one of the listed acceptable manufactures provided that products furnished comply with respective product specifications and are suitable for the application and intent of design.

B. Subject to compliance with requirements, manufacturers not referenced or listed in Specifications or on Drawings who offer products equivalent to referenced products may be acceptable if proposed substitution is requested ten (10) working days prior to bidding and approved in compliance with provisions of "Substitutions" in "Instructions to Bidders".

2.02 GROUT

A. Non-shrink, Non-metallic Grout: ASTM C 1107, Grade B.

B. Characteristics: Post-hardening, volume adjusting, dry, hydraulic -cement grout, non-staining, non-corrosive, non-gaseous, and recommended for interior and exterior applications, design mix to be 5000 PSI, 28-day compressive strength with premixed factory packaged.

PART 3 – EXECUTION

3.01 CORRELATION OF WORK WITH DRAWING AND SPECIFICATION DISPARITY

A. If specifications for a particular product, process, material, or installation differ from representations on Drawings, respective product, material, or process utilized shall comply with the more comprehensive quality and quantity requirements and the more restrictive limits, unless directed otherwise by A/E/D.

1. Verify governing requirements for respective installation with A/E/D prior to ordering respective product or performing respective work.

B. Work which meets the less comprehensive requirements or the less restrictive limits may be provided for an installation if both of the following two (2) conditions are met:

1. A/E/D shall have determined that the more comprehensive requirements or the more restrictive limits are not required for the particular installation and confirmed the determination in writing.

2. Contractor shall give Owner a credit for the cost difference, if any, between the subject variant material or method requirements; credited by change order or other acceptable means.

3.02 EXAMINATION, GENERAL

A. Examine areas and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.03 ROUGH-IN, GENERAL

A. Verify required rough-in nature, size, and locations for actual equipment to be connected and coordinate field measurements. Respective rough-in provisions are specified in respective equipment and system Sections and indicated necessary on Drawings.

3.04 HVAC INSTALLATIONS, GENERAL

A. Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment.

1. Coordinate mechanical systems, equipment, and materials installation with other building components. Verify all dimensions by field measurements.

2. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations. Coordinate penetrations with fire stopping work.

3. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

4. Sequence, coordinate, and integrate delivery and installation of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing in the building.

B. Work shall be performed by fully qualified respective trade craft-persons skilled in execution of the respective tasks; following industry standard practices, in compliance with applicable codes, regulations, specified methods and procedures, and respective manufacturer's instructions.

C. All systems and equipment shall be installed complete and fully operable, unless specifically instructed otherwise for a particular system or item.

1. Provide appropriate automatic control devices compatible with existing controls and systems, installed and arranged as required to operate and sequence respective equipment and systems to maintain intended conditions.

2. Provide an appropriate air device (diffuser, grille, register, etc.), installed at every duct termination, unless specifically noted otherwise for a particular location.

D. Where mounting heights are not dimensioned or detailed, install systems, materials, and equipment to provide maximum possible headroom.

E. Install systems, materials, and equipment generally to conform to arrangements indicated by Contract Documents and approved submittal data, including coordination drawings, to greatest extent possible. Where coordination requirements conflict with individual system requirements, refer conflict to A/E/D.

1. Install work level and plumb, parallel and perpendicular to other building systems and components where exposed in finished spaces, except where indicated otherwise. Give right-of-way priority to systems required to be installed at a specified slope.

F. In addition to conforming to these general provisions, install respective products and systems in compliance with provisions in respective Sections and on respective Drawings. Refer to Project Manual "Table of Contents" for respective Section numbers and titles.

G. Electrical Work provided as a Part of Mechanical Work: Comply with applicable requirements of Division 26.

H. Provide access panels or doors where concealed equipment, devices, etc., are not accessible through accessible ceiling or are not accessible by other appropriate acceptable access means.

I. Provide identification specified in Section "HVAC Identification" Section 230553.

3.05 EQUIPMENT POSITIONING AND CONNECTIONS, GENERAL

A. Provide complete wiring and piping diagrams of each piece of equipment. Furnish diagrams to other trades involved, with all of manufacturer's requirements and recommendations included.

B. Where equipment piping details are not shown on Drawings, manufacturers' recommendations plus code requirements shall be considered to be minimum requirements.

C. Position and connect all equipment for convenient servicing. Extend grease fittings to an accessible location. Prior to final hook-up and demonstrate that there is room to remove and service all respective components (coils, burners, tube bundles, filters, pumps, motors, controls, etc.).

3.06 ERECTION OF METAL AND WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place supports and anchorage accurately in location, alignment, and elevation; sized and arranged to adequately support and anchor respective mechanical materials and equipment. Attach to substrates as required to support applied loads. Make tight connections between members.

B. Metal Supports and Anchorage: Appropriate miscellaneous metal. Field welding shall comply with AWS D1.1.

C. Wood Supports and Anchorage: Grounds, nailers, blocking, anchorage, etc.

1. Select fastener size that will not penetrate through members where opposite side will be exposed to view or will receive finish materials. Install fasteners without splitting wood members.

3.07 CUTTING AND PATCHING, GENERAL

A. Division 01 Section "Cutting and Patching" governs respective work.

B. Coordinate timing of mechanical work installation with related construction to eliminate the need for cutting and patching as much as possible.

C. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Skilled mechanics of the trades involved shall perform cutting. Repair cut surfaces to match material and finish of adjacent surfaces.

3.08 GROUTING

A. Install non-metallic, no shrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout and provide forms for placement of grout, as required.

C. Avoid air entrapment when placing grout and place grout completely filling equipment bases.

D. Place grout on concrete bases to provide a smooth bearing surface for equipment.

E. Place grout around anchors and cure placed grout according to manufacturer's printed instructions.

3.09 FIRESTOPPING

A. Fire stopping will be performed by Mechanical Contractor or Installer responsible for Division 07 Section "Fire Stopping". Refer to "Fire Stopping" Section, if used in this manual, for requirements for fire stopping through-penetrations in fire-resistance-rated construction, smoke barriers, etc.

B. Cooperate with Fire Stopping Installer and coordinate mechanical installation work with fire stopping materials and work. Keep Fire Stopping Installer informed of mechanical installation progress so fire stopping preparation and work may be performed in a timely manner.

C. Arrange mechanical installations so that respective fire stopping can be installed in compliance with governing requirements. Coordinate hole sizes, locations, arrangements, sleeves, etc. with respective mechanical items and fire stopping materials and methods.

END OF SECTION 23 05 00

PART 1 – GENERAL

1.01 SCOPE

A. This section is coordinated with 23 05 00 Common Work Results for HVAC and Supplementary General Conditions wherever applicable to HVAC work. Where items of the General Conditions or Supplementary General Conditions are repeated in this section of the Specifications, it is intended to call particular attention to or qualify them; it is not intended that any other parts of the General Conditions or Supplementary General Conditions shall be assumed to be omitted if not repeated herein.

B. This section applies equally and specifically to all Trades supplying labor and/or equipment, and/or materials as required under the HVAC sections of the specifications.

C. It is the intention of these plans and specifications to call for finished work, completely tested and ready for the Owner's operation. The Contractor shall submit before bidding the project a detailed description of any problems to the Bid Documents for any reason whatsoever: i.e., materials or apparatus believed unsuitable or inadequate, violation of codes, ordinances, rules or regulations, items of work omitted, incorrect service locations or condition etc. The absence of such written notice shall indicate agreement that all cost of any such required changes have been anticipated and included in the Bid.

D. Work described and referenced in Division 23 of the project manual and on the drawings noted ‘HVAC’ shall be the responsibility of the contractor for respective Division 23 work unless the work is specifically assigned to another contractor or party

1.02 DEFINITIONS

A. The following list of words is defined to amplify their meaning whenever used on the mechanical drawings, or in Division 23 of these specifications. Those definitions supersede any other definitions, given or inferred by the General Provisions, Supplementary Conditions or any (Webster) standard definitions for usage in Division 23 only:

1. Furnish - to supply (only) to another party for their use or installation, with all cost of delivery to job site.
2. Install - to unload, distribute, uncrate, assemble and fix into the intended final position, the installer to provide all miscellaneous hardware required to anchor and/or support securely, clean up and dispose of rubbish.
3. Connect - to bring service(s) to point of installation and make all final connections of the service(s) to the installed equipment, and provide all miscellaneous auxiliary appurtenances necessary to make operable for its intended final use.
4. Provide - to furnish, install and connect operating and complete.
5. The "Contractor" means specifically the Contractor and/or Subcontractor working under his respective section of the specifications.
6. "Piping" includes, in addition to pipe, all fittings, valves, hangers, insulation and other accessories relating to such piping.
7. "Concealed" means hidden from sight in trenches, chases, furred spaces, shafts, hung ceiling, embedded in construction, or in crawl spaces.
8. “Equal" means any equipment or material which, in the opinion of the Architect/ Engineer/ Designer, is equal in quality, durability, appearance, strength, design and performance to the equipment or material specified and will function adequately in accordance with the general design.

9. The General, Mechanical (Plumbing and HVAC), Electrical and Temperature Control Contractor's are referred to herein and on the drawings as G.C., M.C., E.C. and T.C.C. respectively.

10. The Architect/Engineer/Designer shall be referred to as A/E/D.

1.03 CONTRACT DOCUMENTS

A. The accompanying drawings and these specifications are complementary each to the other and what is called for on one shall be as binding as if called for by both. The drawings being more specific with quantity, the specifications more specific with quality.

B. This Contractor is requested and shall be held to having examined all drawings and specifications for all trades, such as Architectural, Structural, Plumbing, Electrical, Heating, Site, etc., in order to familiarize himself with the requirements of all of the trades as applied to this Contractor's work. No allowances will be made for deviations from work shown to coordinate this Contractor's work with work of other Contractors.

C. Any doubt as to the intent of the drawings and/or specifications shall be submitted to the A/E/D in writing, requesting an interpretation. Interpretation will be by Addendum only, issued by the A/E/D. The person submitting the request will be responsible for its delivery.

D. Under no circumstances shall any sizes be decreased or radical changes in any part of the installation be made without the written consent of the A/E/D.

E. Elevations and grades shown on drawings are approximate only. This Contractor shall verify same on premises and shall take all measurements and determine all final elevations and be responsible for same applying to his work.

1.04 EQUIPMENT LIST AND SUBSTITUTIONS

A. Each bidder shall prepare a list covering typical important items of equipment involved in his portion of the Contract. A sub-contractor and material list is to be provided with the Bid. This may or may not also be in the front portion of this Specification.

B. Certain manufactured articles specified herein are mentioned under one or more trade or manufacturer's names. These manufactured articles, as specified and detailed on drawings, shall form the basis of the contractor's bid. Additional products or product manufacturers will be permitted by addendum only.

C. Articles of other manufacturers, of equivalent design, quality and capacity, as adjudged by the A/E/D will be considered no later than ten (10) working days prior to bid date. Establishing proof of the equality of the product to that specified shall be the responsibility of the bidder. Determination of equality of all products is vested in the A/E/D whose decision shall be final and binding upon all concerned. No substitutions will be allowed after the Contract is awarded.

D. Where a Contractor proposes to use an item of equipment other than that as designed and detailed on the drawings (even though listed as an acceptable manufacturer) which requires purchase of additional and/or specific equipment, more space, or any re-design of any other part of the mechanical, electrical or architectural layout, all such re-design and all new drawings required shall be prepared by the Contractor, at his own expense. And, should this re-design require additional cost to other Contractors, this expense shall be borne by the Contractor making such changes. All changes must be approved by A/E/D. The Contractor and manufacturer and/or representative shall be responsible to coordinate physical limitations of equipment prior to bidding. No requests for extras will be allowed due to changes required by equipment substitutions.

1.05 CODES, LAWS, ORDINANCES, PERMITS AND FEES

A. HVAC installation shall comply with all requirements of the State Board of Health, and the Indiana Mechanical Code with all their respective amendments.

B. Mechanical installation shall comply with the International Mechanical Code with Indiana Amendments in effect at the time of Construction.

C. Pipe welding shall conform to "Welding Code for Steel and Wrought Iron Pipe" of the "Heating, Piping, and Air Conditioning Contractors' National Associations."

D. All installations shall comply with the latest editions, issues or supplements of all applicable codes, ordinances, regulations and requirements without increase in contract price. Such provision, rules, regulations and ordinances are to be considered as much a part of these specifications as if repeated herein or attached hereto. All changes or modifications required to conform to such codes, regulations, or requirements must be reviewed, the same as Shop Drawings, by the A/E/D.

E. The Contractor shall give all necessary notices, obtain and pay all utility company bills or governmental taxes, fees for connections, water taps and other costs in connection with his work; and he shall also maintain and pay special charges, overtime, or provide any special protection, barricades, lights, personnel as may be required by the State, County, Owner or City in the performance of the contract requirements, as well as providing the necessary equipment to dig or drive and provide de-watering or shoring by any means designated so as to comply with the governing bodies' procedures.

F. All materials furnished and all work installed shall comply with the rules and recommendations of the National Fire Protection Association, with all requirements of the local utility companies, with the recommendations of the Owner’s fire insurance rating organization having jurisdiction, and with the requirements of all governmental departments having jurisdiction.

G. This Contractor shall assume all responsibility of proper installation of services to meet all rules and regulations of the utility or governmental agent involved and pay all fees or charges required.

H. All details shall be verified before bidding with each utility or agency and no allowances will be made in the Contract to properly or differently than detailed install any service.

1.06 SITE VERIFICATION

A. This Contractor is directed to visit the premises and make him/her self thoroughly familiar with the general layout of the building site and the location of present lines to which connections shall be made. He shall also check present grades, ditches, pavements, sewers, and/or all other conditions affecting the service installations contemplated under this Contract. Such offsets as may be required to leave new work clear, etc. must be included in the Contractor's proposal, and the Contractor must assume the full responsibility for having made a proper and thorough investigation of these requirements. The contractor is to review the construction documents and visit the premises prior to bidding. Visits to the facility by the prospective contractors must be coordinated with the A/E/D.

B. No extras will be allowed subsequently to the successful Contractor to cover any such error, omission and/or oversight on the part of the contractor for not having made a thorough inspection of the grounds, facilities, building conditions, proposed drawings etc.

C. Contractor shall further inspect the site and see for himself the available storage space, trucking facilities for bringing materials into the building/area and must assume responsibility for receiving, unloading, storing freight, demurrage, theft and any and all other factors influencing the work under this specification.

1.07 INTERFACE

A. Refer to drawings and specifications for other Divisions of work to determine materials and conditions of other work where Division 23 work meets or connects to such other work. Coordinate respective Division 23 work with work of other Divisions.

1.08 COORDINATION OF WORK

A. Locations of various parts of the equipment, ductwork, services and piping shown by Mechanical (HVAC) Plans are diagrammatic and approximately correct. Exact location shall be determined on job and governed by structural conditions of the building and work of other Contractors, subject to decision of A/E/D, who reserves the right to make any reasonable change in locations indicated without extra charge to Owner.

B. Contractor shall study and become familiar with contract drawings of other trades and A/E/D's drawings in order to obtain all necessary information in order that all interferences with work of other trades may be avoided. Cooperate with all other workmen and install work in such a way that all interferences are avoided. All work shall be installed so that all parts required are readily accessible for inspection, operation, removal, maintenance and repair.

C. All pipe, apparatus, appliances or other items interfering with proper placement of other work, as indicated on the drawings, specified, or required, shall be removed and shall be re-located and re-connected without extra cost. All damage to other work caused by this Contractor, his Subcontractors or his workmen, by reason of neglect, accident or any cause whatsoever, shall be repaired and made good in the same manner as specified for new work of the same character.

D. Openings and chases shall be left in new walls for this Contractor's work when so requested before general work so affected is completed. Where this Contractor has failed to make such request at proper time, he shall pay for all cutting, patching, etc., of the building required for this work.

1.09 LAYING OUT

A. This Contractor shall take all measurements necessary for his work and shall assume responsibility for their accuracy. This Contractor shall not scale Mechanical Drawings but shall obtain all dimensions from building and the Construction Drawings unless specified herein or shown on drawings.

1.12 PROTECTION

A. The Contractor shall be responsible for the maintenance and protection of all equipment, materials, and tools supplied by him and stored or installed on the job site from loss, theft, vandalism or damage until final acceptance by the Owner.

B. The Contractor shall be responsible for the protection of Owner's materials and equipment, and any finished work of other trades from damage or defacement by his operations and must remedy any such injury at his own expense.

C. Openings in exterior walls, and roofs, particularly at or below grade, shall be kept properly plugged at all times. After completion of work, openings for which the Contractor is responsible shall be permanently sealed and caulked in the manner approved by the A/E/D.

1.13 SHOP DRAWINGS

A. Contractor shall submit electronically in PDF Format shop drawing to A/E/D for review before commencing any work or providing materials. Review of shop drawing does not relieve contractor of correct ordering and installations. Electronic shop drawing systems may be employed and will be detailed at the onset if allowed.

B. Drawings submitted shall bear the stamp of approval of the Contractor as evidence that the drawings have been checked by the Contractor and comply with the requirements of the contract drawings and specifications. Any drawings submitted without this stamp of approval will not be considered and will be returned to the Contractor for resubmission. If the drawings submitted show variations from the requirements of the Contract, the Contractor shall make specific mention of such variations in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment, otherwise, the Contractor will not be

relieved of the responsibility of executing the work in accordance with the Contract even though such drawings have been reviewed.

C. The A/E/D's reviewing of the Contractor's and Subcontractor's Drawings or Equipment Details does not relieve the Contractor from responsibility for errors, omissions, or equipment capacities which may exist or develop even though work is done and equipment furnished in accordance with such checked or reviewed drawings.

D. The reviewing of Contractor's and Subcontractor's drawings or equipment details by the A/E/D is a gratuitous assistance and the A/E/D does not thereby assume responsibility for errors or omissions. Where such errors or omissions are discovered later, they shall be made good by the Contractor irrespective of any review by the A/E/D.

E. Review by A/E/D applies only to capacity, quality, general arrangement, design and type. Approval does not apply to quantities, dimensions, connection locations and similar. In all cases, Contractors shall be responsible for furnishing the proper quantities of equipment and/or materials required, that all equipment fits the available space in satisfactory manner and that all piping, electrical and other connections are suitably located.

F. Review by A/E/D will not modify or nullify any provisions of Contract Documents which include Drawings and Specifications, nor will approval relieve Contractor from responsibility for error, omissions and deviations from Contract Documents.

1.14 RECORD DRAWINGS

A. The Contractor shall keep an accurate, current and progressive record of all installed work, including all changes and deviations from the design drawings. Recordings shall be made on prints kept in good condition at the job site as the work progresses and before any work is covered. Detail drawings shall be made if necessary for clarity.

B. Recordings shall be made on prints kept in good condition at the job site as the work progresses and before any work is covered. The field drawings are to be brought to the construction progress meetings for periodic checks.

C. Upon completion of the contract work, the Contractor shall deliver the marked-up prints to the A/E/D with a signed certification by a principal of the contracting firm, that all work was installed as shown.

D. All labor and material costs incurred in the accomplishment of the foregoing requirements shall be borne by the Contractor. Final approval of the work and final payment shall be withheld until after receipt of the marked as built prints.

1.15 FIELD INSTRUCTIONS

A. During construction, the A/E/D shall observe the work and give written field instructions as required without invalidating the Contract. Such field instruction shall not be construed as authority to change the terms of the Contract

B. In cases where extra cost or reductions in cost of the Contract are involved, the Contractor shall notify the A/E/D in writing at the time of such instructions and shall establish cost difference and shall receive written approval before proceeding. The Contractor shall not be reimbursed for extra work unless this procedure has been followed.

1.16 CLEAN-UP

A. Contractor shall remove from site, and legally dispose of, rubbish resulting from the work under his Contract. Rubbish shall be removed daily and not be allowed to accumulate. Owner has first right of salvage. Owner salvaged items shall be delivered to Owner by the Contractor at specified locations.

1.17 POWER FACTOR CORRECTION

A. Contractor shall provide power correction capacitors for all motors 1-1/2 horse power and larger that are furnished pre-wired with starters from factory. Power correction shall be as follows:

1. All motors with power factor of less than .85 shall be provided with capacitors to correct power factor to not less than .90.

2. Do not install power factor correction capacitors on motors fed by Adjustable Frequency Drive (AFD) units.

1.18 MOTOR STARTERS AND MOTORS

A. All equipment herein that is specified to be complete with motors and/or motor starters shall be across-the-line type except as noted below:

1. Part winding motor and reduced voltage starters shall be provided on motors and compressors as follows:

a. 208/240 volt - 3 phase - 25 horsepower and above;

b. 440/480 volt - 3 phase - 50 horsepower and above.

c. Starter manufacturer to coordinate exact details with motor manufacturer.

2. Where multi-speed motors and starters are to be provided as required by the Contract Documents, starter manufacturer to coordinate exact details with motor manufacturer.

3. Adjustable frequency drives (AFD) shall be specified in Division 26.

4. All motors, 3HP and above shall be high efficiency and tested for compliance with IEEE Standards and 112-B. Motors 5HP and above are to be premium high efficiency.

5. All electric motors must be selected with the capacity to operate driven equipment under all conditions of operation on the equipment's operating curve without overload.

1.19 SYSTEM START-UP

A. All Contractors shall note that at job completion the following system checkout shall be performed: The A/E/D shall be notified forty-eight (48) hours prior to the performance of this work.

1. All equipment shall be tested in conjunction with Test and Balance Contractor, Mechanical Contractor and Sheet Metal Contractor to see that all functions as specified.

2. Refrigeration cycle to be tested in conjunction with supplier of refrigeration equipment and the Electrical Contractor and Mechanical Contractor are to assure proper operation.

3. The Contractor shall verify all control sequences, static pressures and interlocks. All heating/cooling controls to be tested in conjunction with Electrical Contractor for proper operation. At conclusion of all tests the Mechanical Contractor shall provide a written report which will include all other written reports such as RTU's or AHU's manufacturer's start up report to the A/E/D.

4. The Contractor shall verify the Heating, Cooling and Ventilation operation of all central and terminal equipment.

PART 2 – PRODUCTS

2.01 PRODUCT WARRANTY

A. All work shall be guaranteed (parts and labor) for a period of one (1) year.

B. Warranty shall run from written date of substantial completion of the work, not from date of installation of a device or piece of equipment, nor from any date set by the equipment supplier relative to his equipment.

2.02 MECHANICAL REFERENCE SYMBOLS, DETAILS AND DRAWINGS

A. Symbols used are diagrammatic are generally generic in nature.

B. Details and Drawings are typical in nature and are subject to variations to suit specific products and project conditions and available space.

PART 3 – EXECUTION

3.01 WORKMANSHIP

A. All work is to be performed in a craftsman like manner as judged by the A/E/D and conform to the Trade Association Standard of Installation.

3.02 INSTALLATION

A. Whenever necessary, the Contractor shall provide all bases and supports not part of the building structure, of required size, type and strength, as approved by the A/E/D for all equipment and materials furnished by him. When earthquake loads are applicable in accordance with the Building Code, mechanical system supports shall be designed and installed for the seismic forces in accordance with the Building Code. Generally all Mechanical systems are to be supported in accordance with the International Mechanical Code with Indiana Ammendments.

3.03 RESPONSIBILITIES

A. The Contractor shall be responsible to coordinate with his subcontractors and to pursue all job problems concerning repair, replacement or proper operation of all systems.

B. It shall be the Contractor's responsibility to determine, in conjunction with the A/E/D if required, the source of any problems and obtain solution and correction of same with all expediency.

3.04 EQUIPMENT ACCESSIBILITY AND SPACE COORDINATION AND PER-BID VERIFICATION REQUIREMENTS

A. Physical size and arrangement of proposed equipment and apparatus must be suitable for the space available. Maintain required clearances and allow space for proper maintenance and placing in the facility and removing from the facility.

1. Prior to bidding project each Contractor and equipment representative must review the installation, arrangement, space available and verify that the proposed installation will retain required clearance and maintain accessibility. Maintenance space must be demonstrated by Contractor.
2. Any deviations required to accommodate equipment etc. must be coordinated by Contractor with A/E/D before bids are accepted on the project. After bids are accepted such work will be part of the Contractor’s work and will add no additional expense to the project.

B. Contractor is responsible for furnishing equipment which is suitable for the space available and must bear the costs for all modifications to his work and the work of others required to accommodate his equipment both the installing and moving into place.

3.05 EQUIPMENT SERVICE AND CONNECTION REQUIREMENTS COORDINATION AND PRE-BID VERIFICATION REQUIREMENTS

A. Service and connection requirements of proposed equipment and apparatus must be compatible with the respective services available as required to accommodate the intent of the design.

B. Mechanical and electrical service connection requirements of a manufacturer’s equipment, even if listed as acceptable, may not be the same as the requirements as the product specified or shown on the construction drawings. Contractor is to make adjustments as required. All connections are to be made complete to accommodate the intent of the design.

1. Prior to bidding the project, each bidding Contractor and respective equipment manufacturer's representative must review the installation arrangement and mechanical and electrical service connections indicated on the Construction Drawings and verify that installation of the proposed equipment will be compatible with the Construction Drawing's, available space and actual conditions.

C. The Contractor is responsible for furnishing equipment etc. which is suitable for the existing or proposed space and services. The Contractor must bear the costs for all modifications to his work and the work of others required to accommodate equipment furnished by the Contractor.

3.06 TESTING AND ADJUSTING

A. Thoroughly test for leaks and operate each system device and item of equipment installed as part of this project and cooperate with the Testing and Balancing Agency (Section 15950) performing the final testing and adjusting of the respective systems.

B. Notify A/E/D 48 hours previous to all testing, adjusting or balancing. Tests must be conducted in the presence of a representative of the A/E/D and a written report is to be provided.

C. System testing and balancing is to be performed after the respective systems have been deemed by the Contractor to be complete and operating in full working order.

3.07 CLEANING

A. All equipment and premises are to be thoroughly cleaned.

B. Air filters for air handling units are to have one set of filters installed at start up. The second set is to be installed just before Air Balance and the third set is to be awarded to Owner for future installation.

3.08 MECHANICAL EQUIPMENT CONTROL WIRING

A. Furnish and install complete all controls and connect control wiring for all equipment provided as part of this project and respective work. Verify operation and correctness of connections and terminations of equipment. Operation of all equipment must be demonstrated to A/E/D and Owner by the Contractor.

B. See Section 23 09 13 Temperature Control.

END OF SECTION 23 05 01

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes following mechanical identification materials and devices to complement Section 23 05 00 "Basic HVAC Materials and Methods": Applicable provisions of Section 23 05 00 govern Work of this Section.

1. Equipment Nameplates.

2. Equipment Labeling and Identification.

B. Provide specified identification for respective installations.

1.02 SUBMITTALS

A. Submit descriptive data and samples of identification materials and products to be installed on this Project. Include specific label wording, lettering style, and other graphic representation for respective applications.

B. Submit valve schedules for each piping system. Furnish extra copies (in addition to mounted copies) in Maintenance Manuals specified in Division 01 Section "Project Closeout".

1.03 QUALITY ASSURANCE

A. Comply with ASME (American Society of Mechanical Engineers) A13.1 Scheme for the Identification of Piping Systems for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Location of identification devices for equipment in finished spaces shall be approved by A/E/D.

1.04 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices after completion of covering and painting where devices are applied to respective surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART 2 – PRODUCTS

2.01 IDENTIFYING DEVICES AND LABELS, GENERAL

A. Utilize manufacturer's standard products of categories and types required for each application as referenced herein and in respective equipment or system Section. Where more than a single type is specified for listed application, selection is Installer's option, but a single selection shall be provided for each category.

B. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, letters and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

2.02 EQUIPMENT NAMEPLATES

A. Respective Manufacturer: Permanently fasten metal nameplate to equipment, engraved or stamped with data.

B. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.

C. Location: Accessible and visible.

2.03 STENCILS

A. Standard stencils with letter size conforming to ASME A13.1

B. Minimum Letter Height: 1-1/4-inches for ducts, 3/4-inch for access door signs and similar operational instructions.

C. Stencil Material: Brass or fiberboard.

D. Stencil 1 Paint: Exterior, oil 1 -based alkyd enamel ; colors according to ASME 13.1, except where indicated otherwise.

E. Stenciled Lettering: Coordinated with corresponding specification and Drawing designation terms, approved by A/E/D.

F. Stenciled Arrows: Arranged to indicate direction of flow.

2.04 ENGRAVED PLASTIC-LAMINATE SIGNS

A. Signs: ASTM D 709, Type I, cellulose, paper-base, phenol ic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except where other colors are indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

B. Engraving: Standard letter style, of specified sizes and with terms to match equipment identification.

C. Thickness: 1/16-inch, for units up to 20 square inches or 8-inches length; 1/8-inch for larger units.

D. Fasteners: Self-tapping stainless steel screws or contact type permanent adhesive.

2.05 EQUIPMENT SIGNS

A. Equipment Signs: Engraved plastic-laminate signs; white with black lettering.

B. Terminology: Following, matching schedules as closely as possible:

1. Name and plan number.

2. Equipment service.

2.06 ACCESS PANEL MARKERS

A. 1/16-inch thick engraved plastic-laminate, with abbreviated terms and numbers corresponding to concealed item; 1/8-inch center attachment hole.

PART 3 – EXECUTION

3.01 LABELING AND IDENTIFYING EQUIPMENT

A. Provide identification signs on all primary equipment (chillers, air handling units, cooling towers, condensing units, etc.) and fans.

B. Lettering Size: Minimum 1/4-inch for name of unit where viewing distance is less than 2-feet, 1/2-inch for distances up to 6-feet, and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.

C. Optional Sign Types: Stencil signs may be provided in stead of engraved plastic, at Installer's option, where lettering larger than 1-inch high is needed for proper identification because of distance from normal location of required identification.

D. Terms on Signs: In addition to name of identified unit, distinguish between multiple units; indicate operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

E. Provide access panel markers where equipment to be identified is concealed above acoustical ceiling, behind access panel, or similar concealment.

3.02 LABELING AND IDENTIFYING DUCT SYSTEMS

A. Identify air supply, return, exhaust, intake, and relief ducts with duct markers: or provide stenciled signs and arrows showing duct system service and direction of air flow.

B. Location: In each space where ducts are exposed or concealed by removable ceiling system. Locate signs near points where ducts enter into concealed space and at maximum intervals of 50 feet.

END OF SECTION 23 05 53

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PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and 23 05 01 HVAC General Requirements, 23 05 00 Common Work Results for HVAC, all General and Supplementary conditions and Division 01 Sections shall apply to this Section.

1.02 SUMMARY

A. This Section includes testing, adjusting and balancing HVAC and Plumbing and Hydronic Systems to produce the design objectives, including the following:

1. Balancing air flow and water flow within distribution systems including sub- mains, branches and terminals to indicated quantities.
2. Adjusting the total HVAC systems to provide indicated requirements and desired results as judged by the A/E/D.
3. Measuring electrical performance of HVAC equipment.
4. Verifying that all automatic control devices installed by the M.C. and T.C.C. are functioning as intended and are properly installed.
5. Providing a written report of the results of the activities and procedures specified in this Section.

1.03 DEFINITIONS

A. Adjust: To regulate fluid rate and air patterns at the terminal equipment, such as to reduce fan speed or regulate a damper.

B. Balance: To proportion flows within the distribution system including sub-mains, branches and terminals according to the design quantities.

C. Draft: A current of air, when referring to localized effect, caused by one or more factors of high air velocity, low ambient temperature, or direction of air flow, whereby more heat is withdrawn from a person’s skin than is normally dissipated. Generally air velocity over persons shall not exceed 50 FPM.

D. Procedure: An approach to and execution of a sequence of work operations.

E. Report form: Test data sheets for recording test data in logical order.

F. Static head: The pressure due to the weight of the fluid above the point of measurement expressed in PSI or feet of water column.

G. Suction head: The height of fluid surface above the centerline of the pump on the suction side usually expressed in feet of water column.

H. System effect: A phenomenon that can create undesired or unpredicted conditions that result in reduced capacities in a part or all of the system.

I. System effect factors: Allowances used to calculate a reduction of performance of a fan or pump etc. installed under different conditions than those used for the design or the manufacturer’s performance testing.

J. Terminal: A point where the control medium, such as fluid or energy enters or leaves the distribution system.

K. Test: A procedure to positively determine quantitative performance of a system or system component.

L. Testing and adjusting and balancing agent: The entity responsible for performing and reporting all testing, adjusting and balancing.

M. Accepted associations: AABC – Associated Air Balance Council, AMCA – Air movement and Control Council, NEBB – National Environmental Balancing Bureau and SMACNA – Sheet Metal and Air Conditioning Contractor's National Association.

1.04 QUALITY ASSURANCE

A. Agent qualifications: Contractor must be a qualified testing adjusting and balancing contractor presently certified by AABC or NEBB.

B. Testing and balancing agencies:

Gibson Services
Fluid Engineering Services (Johnson Controls Inc.)
Mechanical Systems Balancing
Bledsoe

C. Balancing Contractor (B.C.) to use standard forms from AABC or NEBB.

D. B.C. to comply with all standards and procedures described in NEBB's "Procedural Standards for Testing, Adjusting and Balancing of environmental Systems."

E. Instruments are to be calibrated at least every 6 months.

F. M.C., E.C. and T.C.C. to provide support and coordinated effort to the B.C. in order to achieve the most accurate testing, adjusting and balancing possible. M.C. to provide volume dampers, deflectors, splitters, valves, test ports, cocks, gauges, thermometers etc. as directed by the B.C.

G. B.C. to provide minimum of 48 hours notice to A/E/D and Owner before testing is erformed. All testing is to be performed after air and water tests have been completed by M.C.

H. Negative or positive air pressure relationships between rooms and areas, as indicated on the Drawings, must be adhered to above exact air quantities.

I. Generally, all listed quantities must be balanced within 10% of the listed flow. B.C. to halt balance and notify A/E/D should irresolvable discrepancies arise. A/E/D is to provide direction to B.C. and M.C. as to how to proceed with balance.

J. B.C. to verify air handling equipment has clean filters installed, belts are aligned and tight and bearings greased etc. before beginning balance and testing.

K. B.C. to verify all piping strainers are clean, valves are installed correctly, coils have correct piping and straight fins, air has been removed from piping systems and all space and equipment control devices and sensors are installed correctly.

L. B.C. to verify all interlock systems are operating correctly.

M. M.C. to install dampers, regulators and valves as directed by B.C. required to achieve a proper testing, adjusting and balancing.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – GENERAL TESTING AND BALANCING PROCEDURES

3.01 PERFORMANCE

A. Perform testing, adjusting and balancing procedures on all and each system in accordance with the procedures detailed in AABC national standards, or NEBB's performance procedures.

B. Cut duct's, pipe's and equipment cabinet's insulation etc. as required for test ports and probes etc. After testing and balancing close holes and patch insulation with new materials like those removed. Restore all vapor barriers complete.

C. Mark equipment settings with paint or permanent marker to provide a resilient identification for damper positions, valve indicators, fan speed controls, levers and such control devices to show final settings. Set and lock all memory stops.

D. Verify that all variable flow systems track true and in proper proportion to system requirements and in correct response to the respective control.

3.02 INSTALLATION TOLERANCES

A. Air handling systems are to be adjusted within plus or minus 10% of design flow for supply, relief and return air. Supply air would preferably be set high before low with other air flows proportional.

B. Hydronic systems are to be adjusted to within 5% of listed design flows.

3.03 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required design supply, return, outside air and exhaust air quantities and static pressures.

B. Measure air quantities at air inlets and outlets.

C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise while maintaining air pressure relationships specified or displayed on drawings.

D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

F. Provide system schematic with design and actual air quantities recorded at each outlet or inlet. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Final adjustment to make allowance for filters being 50% loaded.

G. Adjust outside air automatic dampers, outside air, return air, relief air and exhaust dampers for design conditions.

3.04 HYDRONIC SYSTEM PROCEDURE

A. Adjust water distribution systems and components to provide design and required flow.

3.05 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing if present:

1. Dual duct boxes and diffusers.

B. Report:

1. Summary Comments:
    a. Design versus final performance
    b. Summary of outdoor and exhaust flows to indicate amount of building pressurization.
    c. Test conditions.
2. Duct Traverses:
    a. System zone/branch (location)
    b. Duct size
    c. Area
    d. Design velocity

e. Design air flow
f. Test velocity
g. Test air flow
h. Duct static pressure
i. Air temperature

3. System diagrams to include layouts of air and hydronic distribution presented with single line drawings which include the following data:
   a. Quantities of outside, supply, relief (exhaust) airflows
   b. Water and steam flow rates
   c. Duct outlet/inlet sizes and flows
   d. Pipe and valve sizes and flows
   e. Terminal units with size and flows listed
   f. Balancing station locations and flows
4. System Coils – Reheats, VAV etc.:
   a. Location, zone, air handling unit number and service
   b. CFM and air static pressure entering and leaving
   c. Coil make, rows, tube size, type and size
5. Seasonal Periods:
   a. If initial adjusting and balancing did not take place during near peak Summer or Winter conditions, perform additional inspections, testing and adjusting during near peak Winter and Summer conditions when they are available.
   b. Testing and adjusting will be performed no less than once at peak Winter and once near peak Summer conditions. Two separate visits minimum are required.
6. Equipment Not Listed:
   a. HVAC equipment required, but not listed, scheduled or called out is to be tested, adjusted and balanced as directed by the A/E/D.

END OF SECTION 23 05 93

PART I - GENERAL

1.01 SUMMARY

A. Section includes general provisions common to mechanical insulation work.

B. Applicable general provisions in this Section govern insulation work the same as if repeated in respective complementary Sections.

C. Provide materials, transportation, labor, and services and insulate respective mechanical work in compliance with provisions herein and in respective system and equipment Insulation Sections and in compliance with notes on Drawings.

D. Fire stopping provisions in Section 23 05 00 Common Work Results for HVAC and 23 05 01 HVAC General Requirements govern fire stopping at mechanical work penetrations of fire resistive and fire rated construction.

1.02 REFERENCES

A. Following standards form a part of mechanical insulation specifications to the extent indicated by references made thereto:

1. American Society of Testing Materials (ASTM).

2. Underwriters' Laboratories (UL).

1.03 SUBMITTALS

A. Submit product data for insulation, jackets, coverings, adhesives, sealants, cements and other materials to be installed on this Project. List materials and thickness for each service application.

B. Provide shop and installation drawings of field fabricated covers. Samples of products may be required at A/E/D’s request.

1.04 QUALITY ASSURANCE

A. Applicator: A company specializing in and experienced in HVAC equipment and systems insulation application. (Insulation Contractor)

B. Fire Performance Characteristics: Insulation, facings, cements, and adhesives shall have 25/50 maximum flame spread/smoke developed rating in accordance with ASTM E84, except insulation outside may be rated 75/150 maximum. Insulation shall be tested by and bear label of U.L. or other testing organization acceptable to authority having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in unopened factory packaging.

B. Protect adhesives, mastics, cements, etc., from freezing.

C. Protect insulating materials from moisture.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Ambient temperatures and conditions during installation operations, and curing period when applicable, shall comply with manufacturer's requirements for respective product (adhesives, mastics, insulation cements, etc.).

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Referenced or listed in respective complementary Insulation Section.

2.02 MATERIAL

A. Specified in respective complementary Insulation Section.

2.03 INSULATION SCHEDULE

A. Ductwork

SERVICE	MATERIAL	JACKET
Supply & Return Air Duct	1½" thick foil faced 3/4lb density fiberglass wrap	Seal joints with foil faced tape
Outside Air Intake Duct	2" thick foil faced 3/4lb density fiberglass wrap	Seal joints with foil faced tape
Plenums and Ducts above un-heated space	2" thick foil faced 3/4lb density fiberglass wrap	Seal joints with foil faced tape

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Before installing insulation, verify that respective work to be insulated is complete, has been tested and cleaned, and is ready to be insulated. Use tarpaulins or other coverings to protect equipment, uncovered piping, ductwork, etc. from dirt and rubbish which may be caused by insulation installation operations.

B. Prior to starting insulation installation operations and while performing work, verify that environmental conditions are within manufacturer's recommendations for sealants, tapes, and other adhesives to be used.

3.02 INSTALLATION OF INSULATION, GENERAL

A. Insulation Work: Performed by qualified tradesmen, following manufacturer's written instructions for respective products, in compliance with applicable building codes and industry standards. (Insulation Contractor).

B. Install insulation over clean, dry surfaces only.

END OF SECTION 23 07 00

PART 1 – GENERAL

1.01 SCOPE

A. Furnish and install duct insulation as shown on the Contract Documents.

1.02 SUBMITTALS

A. Submit descriptive literature for approval.

B. Submit samples if requested.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Schuller,
2. Owens Corning,
3. Armstrong,
4. Certain-Teed
5. Knauf.

2.02 INSULATION

A. Blanket glass fiber insulation thickness shall be minimum 1-1/2" thickness for supply and return and 2” thick for outside air intake with a thermal conductivity of 0.30 at 75° F differential; vapor barrier shall be combination aluminum foil reinforced with glass fiber yarn mesh and laminated to 40 lb. flame resistant Kraft paper having 2" tab.

B. All insulation inside building shall be UL listed and have composite UL flame spread and smoke developed ratings not exceeding 25 and 50. Accessories such as adhesives, mastics, cements, tapes, glass, fabric, etc., shall have same component ratings as insulation.

2.03 ACCESSORIES

A. Sealants, mastics and adhesives shall be as recommended by insulation manufacturer and shall be vermin proof.

PART 3 – EXECUTION

3.01 PREPERATION

A. Prior to beginning work, verify that duct surfaces are clean, sealed, and dry. Carefully inspect the work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

3.02 REQUIREMENTS

A. Exposed fabricated unlined sheet metal plenums, unlined housings, unlined outside air ductwork and rectangular air conditioning supply in equipment rooms shall be externally insulated with rigid board glass fiber insulation.

B. Ductwork shall be externally insulated with blanket glass fiber insulation as indicated above and on drawings.

3.03 INSTALLATIONS

A. Cover all joints on external insulation with 3" wide foil reinforced kraft tape specifically manufactured for this application.

B. All insulation shall be installed with edges tightly butted. Any insulation which is not so installed or shows evidence of leaking, sagging, buckling or sweating shall be replaced in its

entirety at no additional cost. All defective insulation shall be remade in its entirety with new materials.

C. All insulation shall be continuous through wall and ceiling openings and sleeves, except at fire or smoke walls or ceilings.

D. Vapor barrier jackets shall be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces shall be insulated and vapor sealed to prevent condensation.

E. Secure insulation tightly to ductwork with all joints tightly butted. Secure insulation to ductwork by using mechanical fasteners which do not pierce duct. Fasteners shall be adhered to ductwork with adhesive and shall be installed on 12" centers in both directions. All joints and penetration of the vapor barrier shall be sealed with 3" pressure seal aluminum foil tape. All cuts or tears shall be sealed with strips of the aluminum foil tape.

END OF SECTION 23 07 13

PART 1 – GENERAL

1.01 WORK DESCRIPTION

A. Scope of work: Furnish and install complete, program and place in acceptable operation environmental control system components as shown or implied on the Contract Documents as judged by the A/E/D and Owner.

B. Work included:

1. Furnish and install pneumatic, electric and direct digital temperature, humidity and pressure controls, actuators and accessories as required to provide a complete operable system which can obtain the operational sequences described.

2. All control and interlock wiring by T.C.C and to be in full compliance with all sections of the electrical specifications.

3. TCC shall prepare electric flow diagrams on all controls, starters and mechanical equipment detailing all terminals in each component.

4. Any and all relays and auxiliary contacts required, which are not furnished by suppliers of the mechanical equipment or starters etc. shall be furnished by the T.C.C.

C. Work not included:

1. E.C. shall provide all power wiring to and from all motor starters, motor control centers, terminal in ceiling VAV and fan powered boxes etc. and to all DDC panels as required.

2. MC to install motorized dampers and any duct mounted airflow measuring stations which are to be furnished by the T.C.C.

3. MC to install all temperature sensing wells and control valves which are to be furnished by the T.C.C.

D. Related work: 23 05 00 Common Work Results HVAC, 23 05 01 General HVAC Requirements, 23 05 53 HVAC Identification and 23 05 93 Testing, Adjusting and Balancing.

1.02 QUALITY ASSURANCE

A. Acceptable T.C.C. installer and designer shall be familiar with the existing system.

1.03 SUBMITTALS

A. Submittals must include the following data and have this date placed in the maintenance manuals:

1. Dimensions and space requirements.

2. Installation instructions.

3. Product description and operational capacities.

4. Sequence of operation for each piece of controlled equipment.

5. Wiring and pneumatic tubing diagrams.

6. Control device arrangements.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Control instruments: All control instruments shall be fully proportional with adjustable sensitivity. P., PI. and PID loops shall be required wherever necessary to afford final stable control within acceptable parameters to satisfy the A/E/D and Owner.

B. Temperature sensors:

1. Space sensors for control shall have limited exposed external adjustment. Adjustment to be plus and minus 4 degs. F. from the null set point programmed through the DDC system. All instruments to have aluminum or plastic covers with thermometers.Sensors to be RTD OHM platinum with an accuracy of plus or minus .5 degs. F.

2. Duct sensors to utilize averaging elements, 1000 OHM platinum RTD having an accuracy of plus or minus .5 degs. F.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Instrument mounting:

1. Room sensors, thermostats and humidistats and such controls shall be installed where shown or required at a height of 54” A.F.F. to the center, unless otherwise indicated.

2. This Contractor shall be responsible for exact field location of all airflow measuring stations, water flow, humidity sensors, pressure sensors and any other variables required as a part of the proper function of the environmental control system. This Contractor shall coordinate the sensors with devices furnished and installed by others. Any conflicts are to be brought to the A/E/D prior to installation.

B. Electrical wiring:

1. Furnish and install interlock, LAN, sensor and actuator wiring. Connect controls in accordance with reviewed wiring diagrams. Install wiring inside panels to terminal strips.

2. Use Belden No. 22 gauge Beldfoil or equal for runs up to 250 ft and Belden No. 18 gauge Beldfoil or equal from 251 ft. to 500 ft.

a. If the sensor wire is over 50ft. long, or must be run in a common conduit, or near inductive loads, use shielded cable. Use Belden No. 22 gauge Beldfoil or equal for runs up to 100ft. Use Belden No. 18 gauge for Beldfoil or equal on runs up to 500ft. Install low voltage sensor and LAN wiring in accordance with local requirements, the National Electrical Code and Division 26 specifications.

3. Installation minimum requirements:

a. In Mechanical or service areas all wiring including cables to be in EMT.

b. Space sensors, alarm wiring and cables in EMT within wall construction.

c. Ceiling (accessible, permanent or drop ceilings with ducted return air) use approved non-plenum cable.

d. Ceilings used as a return air plenum use EMT.

e. The use of cable is limited to low voltage (less than 24 volts) only. In no case shall cables be allowed to lay on the ceiling grid.

4. Grounding:

a. Provide stable grounding for digital equipment.

b. Install a separate ground to earth using existing water piping with a verified ground or a copper rod driven into the ground as suggested by the equipment manufacturer. In no situation may the ground be connected to the building neutral conductors, either at the breaker or at the main feeder entrance to the building.

5. Transient protection:

a. All electronic equipment including processors, relays, monitoring devices, temperature sensors and other non-computerized solid state equipment will be adequately protected against power line transients or RFI interface. All components to meet IEEE/ANSI standards.

b. Equipment that fails to operate properly due to transient or other electrical interference, in the opinion of the A/E/D or Owner, will be required to be retrofitted with the appropriate protection device(s).

c. Provide an isolation transformer as a separate component on the 110 VAC power supply to the digital controllers.

6. All controls must be routed in EMT separate from any power feed wiring.

C. Warranty:

1. At completion of the final test of the installation and acceptance by the A/E/D and Owner the T.C.C. shall provide any and all service for a period of 24 months.

2. Warrant all equipment, damper actuators, valves, accessories, printers, computers and components that are part of the T.C. System for 24 months against defects and craftsmanship. During warranty period T.C.C. to expediently replace or repair at no charge to the Owner all equipment, parts and systems, with no exceptions, which fail.

END OF SECTION 23 09 13

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23 30 00
AIR DISTRIBUTION

PART 1 – GENERAL

1.01 SYSTEMS

A. Air distribution systems include but are not necessarily limited to the following:

1. Ventilation
2. Heating
3. Air Conditioning
4. Exhaust

B. Air distribution equipment and apparatus, direct fired heating equipment, DX cooling equipment, air moving equipment without coils, ductwork, terminals, etc. are included in this section and respective subsections.

1.02 QUALITY ASSURANCE

A. Requirements in Sections 23 05 00 and 23 05 01 govern equipment in this section and equipment supplier responsibilities.

B. All products of a similar type shall be from the same manufacturer.

C. Manufacturer's identifying numbers referred to herein and on drawings are to establish general design. Actual identification numbers denoting features specified or required shall be determined by contractor and supplier through comparison of the respective manufacturer's specifications with the project specifications, drawings and job conditions.

D. See specific item for listing of manufacturers.

.PART 2 – PRODUCTS

2.01 PRODUCTS ARE NOT INCLUDED IN THIS SECTION BUT ARE INCLUDED IN OTHER DIVISION 23 SECTIONS

PART 3 - EXECUTION

3.01 INSTALLATION OF AIR HANDLING EQUIPMENT AND SYSTEMS

A. Air Handling Equipment and Systems: installed as shown on drawings, in compliance with requirements included in respective specifications and related sections. All installations shall be coordinated with other work, complete with all hardware and accessories even though some parts may be omitted on drawings.

3.02 AIR LEAK TESTING

A. Test all duct systems for leaks and seal all leaks.

3.03 PERFORMANCE TESTING, ADJUSTING AND BALANCING

A. Testing, Adjusting and Balancing: performed in compliance, with all leak testing and duct sealing completed before balancing is started by installing Contractor.

B. Verify that adjustable sheaves as specified have been furnished and that furnished sheaves allow necessary adjustments to obtain the required air volume determined by the balancing technician. Replace with proper sheaves where required to allow balancing.

1. After Air Handling unit sheaves have been adjusted for proper air volume, replace adjustable sheaves with fixed sheaves of proper size to produce required air volume on units of 5000 CFM or more..

C. Verify that all ductwork and coils have been cleaned and left free of loose insulation and construction debris.

D. Initially start, lubricate and balance all fans to eliminate noise and vibration.

E. Install clean filters, media, etc. immediately before balancing is started.

F. Supply all balancing and adjusting dampers shown and as required to obtain final system balance.

END OF SECTION 23 30 00

PART 1 – GENERAL

1.01 DESCRIPTION

A. Ductwork and accessories for HVAC including the following:

1. Supply air, return air and exhaust air systems.

B. Definitions:

1. SMACNA Standards as used in this specification means the HVAC Duct Construction Standards, Metal and Flexible.

2. Seal or Sealing: Use liquid or mastic as an additional sealant, with or without compatible tape overlay or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.

3. Duct Pressure Classification: SMACNA HVAC Duct Construction Standards, Metal and Flexible.

4. Exposed Duct: Exposed to view in a finished room.

1.02 QUALITY ASSURANCE

A. Fire Safety Code: Comply with NFPA 90A.

B. Duct System Construction and Installation: Referenced SMACNA Standards are the minimum acceptable quality.

C. Duct accessories exposed to the air stream, such as dampers of all types (except smoke dampers) and access openings, shall be of the same material as the duct or provide at least the same level of corrosion resistance.

1.03 SUBMITTALS

A. Coordinate with administrative requirements for submittal procedures.

B. See Section 01 32 00

1.04 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Air Diffusion Council Test Code:

1. 1062R4 Certification, Rating, and Test Manual (1977)

C. Air Moving and Conditioning Association (AMCA):

1. 500-75 Test Method and Louvers, Dampers and Shutters

D. American Society for Testing and Materials (ASTM):

1. A527-90 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality

2. A569-91 Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality

E. National Fire Protection Association (NFPA):

1. 90A-96 Standard for the Installation of Air Conditioning and Ventilating Systems

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. HVAC Duct Construction Standards, Metal and Flexible, 2nd Edition-1995

2. HVAC Air Duct Leakage Test Manual, 1st Edition, 1985

G. Underwriters Laboratories, Inc. (UL):

1. 33-87 UL Standard for Safety Heat Responsive Links for Fire Protection Service.
2. 181-90 UL Standard for Safety Factory-Made Air Ducts and Connectors.
3. 555-90 UL Standard of Fire Dampers
4. 555S-83 UL Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems.

PART 2 – PRODUCTS

2.01 DUCT MATERIALS AND SEALANT

A. General: Except for systems specified otherwise, construct ducts, casings, and accessories of galvanized sheet steel, ASTM A527, coating G90; or, aluminum sheet, ASTM B209, alloy 1100, 3003 or 5052.

B. Joint Sealing: Refer to SMACNA Standards, paragraph S1.8 and S1.9.

1. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread and 50 smoke developed (dry state) compounded specifically for sealing ductwork as recommended by the manufacturer. Generally provide liquid sealant, with or without compatible tape, for low clearance slip joints and heavy, permanently elastic, mastic type where clearances are larger. Oil base caulking and glazing compounds are not acceptable because they do not retain elasticity and bond.
2. Tape: Use only tape specifically designated by the sealant manufacturer and apply only over wet sealant. Pressure sensitive tape shall not be used on bare metal or on dry sealant.

C. Approved factory made joints by Pittsburg Lock may be used Snap or Button Lock is not acceptable.

2.02 DUCT CONSTRUCTION AND INSTALLATION

A. Follow SMACNA HVAC Duct Construction Standards. Acceptable connection to be Pittsburgh Lock Joints. (Snap Lock is not acceptable)

B. Duct Pressure Classes:

1. Supply and return ductwork: 2" Pressure Class

C. Seal Classes: In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

D. Volume Dampers: Single blade or opposed blade, multi-louver type as detailed in SMACNA Standards.

E. Duct Hangers and Supports: Refer to SMACNA Standards Section IV. Avoid use of trapeze hangers for round duct.

2.03 DUCT ACCESS DOORS, PANELS AND SECTIONS

A. Provide access doors, sized and located for maintenance work, upstream, in the following locations:

1. Each duct mounted smoke/heat detector and fire/smoke dampers.

B. Openings shall be as large as feasible in small ducts, 16 inch by 16 inch minimum where possible. Access sections in insulated ducts shall be double-wall, insulated. Transparent shatterproof covers are preferred for un-insulated ducts.

2.04 FLEXIBLE AIR DUCT CONNECTORS

A. General: Factory fabricated, complying with NFPA 90A for connectors not passing through

floors of buildings. Flexible ducts shall not penetrate any fire or smoke barrier which is required to have a fire resistance rating of one hour or more. Flexible duct length shall not exceed 4 feet. Provide insulated acoustical air duct connectors in supply air duct systems and elsewhere as shown.

B. Flexible ducts shall be listed by Underwriters Laboratories, Inc., complying with UL 181. Ducts larger than 8 inches in diameter shall be Class 1. Ducts 8 inches in diameter and smaller may be Class 1 or Class 2.

C. Insulated Flexible Air Duct: Factory made including mineral fiber insulation with maximum C factor of 0.25 at 24*C (75*F) mean temperature, encased with a low permeability moisture barrier outer jacket, having a puncture resistance of not less than 50 Beach Units. Acoustic insertion loss shall not be less than 3 dB per foot of straight duct, at 500 Hz, based on 6 inch duct, of 2500 fpm.

D. Application Criteria:

1. Temperature range: 0 to 200^0F internal.

2. Maximum working velocity: 2500 feet per minute.

3. Maximum working pressure, inches of water gage: 2 inches positive, 1 inches negative.

E. Duct Clamps: 100 percent nylon strap, 175 pounds minimum loop tensile strength manufactured for this purpose or stainless steel strap with cadmium plated worm gear tightening device. Apply clamps with sealant and as approved for UL 181, Class 1 installation.

2.05 FLEXIBLE CONNECTIONS

A. Where duct connections are made to fans and air handling units, install a non-combustible flexible connection of 29 ounce neoprene coated fiberglass fabric approximately 6 inches wide.

B. For connections exposed to sun and weather provide hypalon coating in lieu of neoprene. Burning characteristics shall conform to NFPA 90A.

C. Allow at least one inch slack to insure that no vibration is transmitted.

PART 3 – EXECUTION

2.01 INSTALLATION

A. Comply with provisions of Section 23 05 00 Common Work Results for HVAC and 23 05 01 Basic HVAC Requirements, particularly regarding coordination with other trades and work in existing building.

B. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards:

1. Drawings show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, boxes, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets at no additional cost to the Owner. Coordinate with other trades for space available and relative location of HVAC equipment and accessories in and above ceiling grid. Duct sizes on the drawings are inside dimensions which may be altered by Contractor to other dimensions with the same square inch of opening and same air handling characteristics where necessary to avoid interference and clearance difficulties. All duct size changes are to be approved by the Engineer.

2. Provide duct transitions, offsets and connections to dampers, coils, and other equipment in accordance with SMACNA Standards, Section II. Provide streamliner, when an obstruction cannot be avoided and must be taken in by a duct. Repair galvanized areas

with galvanizing repair compound.

B. Install duct hangers and supports in accordance with SMACNA Standards, Section IV.

C. Flexible duct installation: Refer to SMACNA Standards, Section III. Ducts shall be continuous, single pieces not over 4 feet long (NFPA 90A), as straight and short as feasible adequately supported. Centerline radius of bends shall be not less than two duct diameters. Make connections with clamps as recommended by SMACNA. Clamp per SMACNA S3.33 and S3.34 with one or any chase or partition designated as fire or smoke barrier, including corridor partitions fire rated one hour or two hour. Support ducts SMACNA Standards.

D. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, paint the inside of the duct with flat black paint to reduce visibility.

E. Control Damper Installation:

1. Provide necessary transitions required to install dampers larger than duct size.

2. Assemble multiple sections dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.

3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.

4. Install all damper control/adjustment devices on stand-offs to allow complete coverage of insulation.

5. Provide any and all volume control dampers as requested by the Balance Contractor.

F. Protection and Cleaning: Adequately protect equipment and materials against physical damage. Place equipment in first class operating condition, or return to source of supply for repair replacement, as determined by A/E/D. Protect equipment and ducts during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting. When new ducts are connected to existing ductwork, clean both new and existing ductwork by mopping and vacuum cleaning inside and outside before operation.

3.02 DUCT LEAKAGE TESTS AND REPAIR

A. Perform smoke test on duct system with A/E/D present before insulation is applied and seal all detectable leaks in the duct as directed by A/E/D.

END OF SECTION 23 31 13

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Duct test holes.

C. Flexible duct connections.

D. Volume control dampers.

1.02 RELATED SECTIONS

A. Section 23 31 13 Metal Ductwork

1.03 REFERENCES

A. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems; National Fire Protection Association; latest Indiana adopted edition.

B. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; latest Indiana adopted edition with any Addenda.

1.04 SUBMITTALS

A. See Section 01 32 00 - for Submittal Procedures.

PART 2 – PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.03 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Connector: Fabric crimped into metal edging strip.

1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq. yd.
2. Net Fabric Width: Approximately 2 inches wide.

2.04 VOLUME CONTROL DAMPERS.

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch. Maximum 6” dimension.

C. Multi-Blade Damper: Above 6” fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware; Model CD504 Manufactured by Ruskin. Single blade is allowable on 6” deep and smaller ducts. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 15815 for duct construction and pressure class.

B. Provide weighted adjustable backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct test holes where indicated and required for testing and balancing purposes.

D. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment

E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION 23 33 13

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, Section 23 31 13 METAL DUCT WORK and Section 23 33 13 DUCT WORK ACCESSORIES apply to this Section.

1.02 SUMMARY

A. This section includes variable air volume terminals for connection to single duct.

1.03 SUBMITTALS

A. Product Data: For each product indicated, include the following:

1. Shop drawings are to indicate materials of construction, interior and exterior finish, and mounting details, plus performance data including heating/cooling capacity and air flows.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers:

1. Krueger
2. Titus
3. Price Industries
4. Tuttle and Bailey

B. Capacity, size and CFM set points are indicated on the drawings.

2.02 CEILING DIFFUSERS

A. Square or rectangle with louvered face constructed of steel or aluminum.

1. Air pattern: To be adjustable from vertical, horizontal and off.
2. Inner assembly: To be removable for access and cleaning.
3. Suspended ceiling: To have panel sizes to fit into ceiling grid.
4. Plaster ceiling etc.: To have overlapping flange.
5. Finish: To be factory applied enameled color as selected by Owner.
6. Reference product: Tuttle and Bailey DFF.

2.03 CEILING RETURN AIR GRILLES

A. Square or rectangle with bars spaced 6.6” o.c. with 42-45 deg. deflection constructed of steel.

1. Finish: To be factory applied enameled color to match ceiling.
2. Ceiling mounting: To have panel sized to fit ceiling grid or be flanged for hard ceiling mounting.
3. Reference product: Tuttle and Bailey T 70D

B. Square or rectangle aluminum egg crate ½” x ½” x 1” deep with no deflection.

1. Finish: To be factory applied enamel color to match ceiling.
2. Ceiling mounting: To have panel sized to fit ceiling grid or flanged for tile mounting.
3. Reference product: Tuttle and Bailey CRE 510

2.04 HEAVY DUTY CEILING AND WALL RETURN AIR GRILLE

A. Square to rectangle steel with reinforced bars spaced ½" o.c. with 45 deg. deflection.

1. Finish: To be factory applied enamel color as selected by Owner.
2. Ceiling or wall mounting: To have panel sized to fit ceiling grid or flanged for tile or wall mounting.
3. Reference product: Tuttle and Bailey T100DG

2.05 CEILING EXHAUST GRILLE

A. Square or rectangle aluminum with bars spaced ¾" o.c. with 42 – 45 deg. deflection

1. Ceiling mounting: To have panel sized to fit ceiling grid or be flanged for tile mounting.
2. Finish: To be natural aluminum unless color specified.
3. Referenced product: Tuttle and Bailey T1100DG

2.06 FILTER EXHAUST OR RETURN GRILLE

A. Square to rectangle steel bars spaced ¾" o.c. with 40 deg. deflection and 2" thick filter.

1. Wall mounting: To have flange for wall mounting.
2. Finish: To be factory applied enamel color as selected by Owner.
3. Access: To have hinged and latchable front for filter service without tools.
4. Filter: To be pleated filter with a 30% efficiency rating @ 1 micron.
5. Reference product: Tuttle and Bailey A 77D

2.07 SUPPLY AIR REGISTER

A. Square to rectangle aluminum with 2 sets of extruded adjustable louvers ¾"o.c.

1. Wall mounting: To have flange for wall mounting.
2. Finish: To be natural aluminum unless color specified.
3. Louvers: Front louvers to be vertical with all louver blades individually adjustable.
4. Reference product: Tuttle and Bailey A64

PART 3 – EXECUTION

3.01 EXAMINATION AND INSTALLATION

A. Examine areas where outlets and inlets are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment, such as proximity to walls and other air flow obstructions.

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

1. Contractor to field verify exact frame requirements for each inlet and outlet.
2. Support units from building structure.
3. Connect to ductwork with draw bands or mechanical devices.
4. Assure access to each outlet and inlet.

END OF SECTION 22 37 13

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General, Supplementary, and Special Conditions apply to all electrical work.

1.02 DESCRIPTION OF WORK

A. Section 260500 applies to all electrical materials, equipment, installations and services supplied under any portion of the work.

B. All work must meet or exceed all Local, State and Federal Codes and ADA Guidelines.

C. All Electrical Contractor or Electrical Sub-contractor work shall be performed by a licensed and bonded Electrical Contractor with at least five (5) years of successful installation experience on projects with electrical work similar to this project.

D. The Electrical Contractor or Electrical Sub-contractor shall coordinate the Basic Requirements as applicable to any equipment, installations and services of an electrical nature.

E. It is the intention of this Division of the Specifications and the accompanying drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and successful operation all equipment, materials, devices and necessary appurtenances to provide a complete electrical system.

F. The Contract drawings indicate the extent and the general location and arrangement of equipment, conduit and wiring. The General Contractor and their Electrical Sub-contractor shall study the plans and details and shall coordinate with all other trades to prevent conflict and interference with other installations.

G. The Electrical Contractor or the Electrical Sub-contractor is responsible for installation of a complete and operating electrical system in accordance with the intent of the Drawings and Specifications.

H. Any minor changes in location of equipment and conduits from those shown on the plans shall be made without extra charge if so directed by the Owner prior to installation.

I. All equipment shall be installed such that maintenance and service may be properly accomplished. If necessary, the Owner may at their option require the contractor to demonstrate the service on any piece of equipment to determine sufficient service space exists. If service space is not adequate, the equipment shall be relocated at no additional cost to the Owner so that sufficient service space is achieved.

1.03 PERMITS AND FEES

A. This work shall include the procurement of and payment for all permits and fees for the performance of the electrical work.

1.04 SUBMITTALS

A. The following items that shall be submitted for approval prior to ordering. Submit individually by the appropriate Specification Section number.

1. Raceway (unless special raceway is specified a letter on Company letterhead stating the products to be used are in conformance with the Specifications is acceptable as a Submittal. Check with Engineer/Owner)
2. Wire (unless special wire is specified a letter on Company letterhead stating the products to be used are in conformance with the Specifications is acceptable as a Submittal. Check with Engineer/Owner)
3. Wiring Devices and Covers
4. Lighting Fixtures
5. Disconnect Switches
6. Motor Starters
7. Panelboards and Switchboards
8. Fire Alarm
9. Others as required by the related Division 26 Section.

B. Submission of the above information shall be electronically in ISU approved PDF Format.

1.05 PROJECT CLOSEOUT

A. On Electrical Prime Projects one set of all Project documents shall be submitted electronically in PDF Format on a USB Flash Drive. The following is a list, but not limited to, of required documentation to be included on the USB flash drive:

1. Bid Form
2. Award Letter and Contract for Construction
3. Meeting minutes and supporting documentation.
4. Reviewed submittals and reviewed shop drawings
5. All Change documentation, e.g. ASI, RFI, CCD, RFP, CP, CO, etc.
6. Pay Applications
7. Installation instructions and schematic drawings
   a. Complete parts list with manufacturer's model numbers.
   b. Complete wiring diagrams showing all connections and internal wiring. Factory typical wiring diagrams are not acceptable.
8. Operating and maintenance instructions.
9. Warranty and guarantee information
10. Substantial Completion documents to determine start of Warranty Period

B. When individual Specification Sections call for close-out submission they may be combined on a master Project close-out USB flash drive with itemized files and sub-files for each Section.

C. Additionally, submit one hard copy of the O&M’s in a 3-ring binder and unfolded Record Drawings.

D. Prior to release of final payment, Indiana State University must receive a complete set of record drawings in AutoCAD 2010 on a CD or DVD. The Design Engineer and the Indiana State University Department of Facilities Management engineering staff must approve these drawings.

1.06 COPPER REQUIREMENTS FOR ELECTRICAL EQUIPMENT

A. All current-carrying components (phase, neutral and ground) of all electrical equipment shall be copper. No CUAL allowed without prior approval of Owner.

B. Exceptions: molded case circuit breakers with in-built lugs and safety switches.

1.07 UNDERGROUND UTILITIES

A. All underground utility lines shall be buried a minimum of 36” below finished grade.

B. Place 3” of compacted red sand below all buried utility lines and cover with 12” of red sand.

C. Remainder of the trench shall be back filled with new topsoil free of debris, compacted in 6” lifts to 98% standard proctor using the water jet method.

D. Install the appropriate 6” wide marker tape a minimum of 12” above any buried utility line.

1.08 NEUTRAL RULES

A. Neutral rules and requirements for multi-circuit branch raceway installations.

1. A separate dedicated neutral shall be installed for every phase conductor in a multi-circuit 120-volt or 277-volt raceway.
2. Neutrals shall be marked in such a way as to prevent the accidental crossing of neutrals at device locations.
3. Neutrals in 120-volt applications shall be white, gray in 277-volt applications.
4. This includes pre-wired raceway systems such as ISODUCT and systems furniture.
5. No sharing of neutrals is allowed.

B. Over sizing of neutral conductors shall not be allowed in lieu of the preceding rules and requirements.

C. THESE RULES SUPERCEDE ANY OTHER NEUTRAL INSTRUCTIONS EITHER WRITTEN OR IMPLIED IN ANY OTHER SPECIFICATION SECTION OR SHOWN ON DRAWINGS.

1.09 RACEWAY SYSTEMS INSTALLATION SUMMARY

A. Provide conduits, cable trays, surface raceways, boxes, fittings and supports to form a complete, coordinated, and continuously grounded raceway system.

B. No more than three (3) single phase (120volt and 277volt) circuits shall be installed in a conduit raceway system.

1.10 RACEWAY REQUIREMENTS

A. Conduits indoors in general areas shall be electrical metallic tubing (EMT) with steel set screw or compression fittings.

B. Conduits indoors in hazardous areas, encased in concrete floorslabs or subjected to water, physical damage or abuse shall be galvanized rigid steel (GRS) or intermediate metal conduit (IMC) with cast or malleable iron threaded fittings and bushings.

C. Conduits indoors for medium voltage distribution circuits or for fire pump feeders shall be galvanized rigid steel conduit with cast or malleable iron threaded fittings and bushings.

D. Conduits outdoors shall be galvanized rigid steel or intermediate metal conduit with cast or malleable iron threaded fittings and bushings.

E. Conduits encased in concrete underground shall be Type DB PVC for IT applications and Schedule 80 for MV applications both with matching fittings.

F. Conduits direct buried underground shall be Schedule 40 PVC with matching fittings.

G. Conduits in steam tunnels shall be galvanized rigid steel or intermediate metal conduit with cast or malleable iron threaded fittings and bushings. Exceptions to this requirement are tunnel segments inside building (i.e., mechanical rooms) where EMT may be used.

H. Final connections to recessed lighting fixtures and under counter lights shall be 1/2" minimum flexible metallic conduit, manufactured wiring systems, or galvanized steel Type MC Cable all with steel fittings.

1. Manufactured wiring systems shall
   a. Only be used above accessible ceilings.
   b. Shall not be used in walls or above permanent ceilings.
   c. Shall contain a dedicated, separate, grounding conductor.

2. Type MC cable conductors shall be color coded to match the building color-coding scheme. Type MC Cable shall be terminated with steel setscrew connectors that have integral insulating bushings. Self-locking, twist-in type fittings are not acceptable.

I. Final connections to motors, transformers and equipment subject to vibration or removal for maintenance shall be 1/2" minimum liquid tight flexible metallic conduit with steel liquid tight fittings. Transformer connections may be non-liquid tight flexible metallic conduit in electrical rooms only.

J. Connections to recessed power receptacles and light switches in areas with accessible ceilings:

1. In new 'metal stud and gypsum board partitions (walls)' and in existing 'metal stud and gypsum board partitions (walls)', where the wall is not being otherwise opened up, the final connections may be made with type MC Cable. This MC Cable, shall:

   a. Be run to a box immediately above the accessible ceiling, and the box size shall not exceed 4-11/16" square.
   b. Conduit shall be used for the entire run, from this junction box, to the power source, load (lights), etc.
   c. No more than three circuits may be run through any given junction box.
   d. Individual conductors making up the MC cable shall be stranded copper, with separate grounding conductor, and steel corrugated armor. Individual conductors shall be color coded as required in section 16120.
   e. The MC Cable is terminated using UL listed hardware intended for the cable and boxes being used, (and rated for commercial and industrial environments).
   f. The MC Cable shall be secured in the wall cavity as required by NEC.
   g. The MC Cable shall be as short as it is necessary to serve the need and meet the Code

K. In areas with non-accessible ceilings devices shall be installed with standard conduit; run back in a continuous installation to a junction box located at an access point in the ceiling

L. Connections to other recessed devices, (including communication outlet boxes, junction or pull boxes, etc) shall be with standard conduit of the type appropriate for the wall construction.

1.11 CABLE TRAY REQUIREMENTS

A. Power and telecommunications cable trays shall be aluminum, ladder type, of the sizes shown on the drawings.

B. Center spline telecommunications cable tray may only be used where shown.

C. Changes in cable tray direction or elevation shall be made using standard fittings from the same manufacturer as the cable tray.

D. Barriers shall be installed in cable trays where shown to separate circuits of different voltage levels.

1.12 SURFACE RACEWAY REQUIREMENTS

A. When conduits in finished areas cannot be concealed in walls or above ceilings, surface raceways may be used where permitted. Boxes and fittings shall match and be from the same manufacturer as the raceways.

B. Raceway shall be metal and white in color unless otherwise noted on the drawings.

C. Contractor shall verify with the Owner if the use of metal surface raceway is acceptable.

1.13 BOX REQUIREMENTS

A. Provide sheet steel outlet boxes, extensions, and plaster rings for EMT, flexible metal conduit, and MC cable.

B. Provide cast or malleable iron outlet boxes and covers for galvanized rigid steel conduits, intermediate metal conduits, and liquidtight flexible metal conduits.

C. Boxes shall be sized for all conductors and devices to be contained within. Box extensions shall not be used to correct for undersized boxes. A single extension may be used as follows only if all free conductors extend at least 3 inches outside of the extension opening.

1. On boxes being flush mounted in masonry walls.
2. On existing boxes in walls that are being furred out.
3. On existing boxes for connecting to an existing circuit.
4. On fire alarm, security and clock system boxes where required by the system manufacturer's instructions.

D. Plaster rings shall not be considered box extensions, but their capacities may be included in box fill calculations.

1.14 SUPPORT REQUIREMENTS

A. Mechanical Areas and Tunnels

1. Surface mounted equipment shall be secured to steel channels.
2. Surface mounted raceway 1½” and smaller and boxes maybe attached directly to surfaces.
3. Multiple raceway runs maybe attached to
   a. A trapeze system with approved straps
   b. Trapeze shall be attached to the structure by steel channels and threaded rod.
4. Vertical surface race way 1½” maybe attached by:
   a. Below 8’ by one or two hole straps
   b. 8” and above with pipe hangers (“Minerallac style hangers”)
5. The channels and raceway shall be attached with toggle bolts to hollow tile, block or similar surfaces, and attached with screws or bolts and expansion shields to solid masonry or concrete.

B. Finished Areas Above Suspended Ceilings

1. Raceway and boxes maybe attached directly to surfaces with appropriate straps or hangers.

2. Multiple raceway runs maybe attached to
    a. A trapeze system with approved straps
    b. Trapeze shall be attached to the structure by steel channels and threaded rod.
3. The channels and raceway shall be attached with toggle bolts to hollow tile, block or similar surfaces, and attached with screws or bolts and expansion shields to solid masonry or concrete.
4. Attachment of raceway to ceiling grid support wires or rods is not permitted.

C. Finished Areas Inside Walls

1. Raceway and boxes shall be attached to structural members with devices specifically designed for raceway/box attachment to the type of structural member used.

D. Finished Areas Exposed

1. Surface raceway shall be attached to finished surfaces utilizing the factory approved method of attachment.
2. Tape is not acceptable for attachment of non-metallic surface raceway.

PART 2 - PRODUCTS

2.01 CONDUITS

A. Electrical metallic tubing shall be thin wall steel tubing, electro-galvanized or hot dipped galvanized inside and outside. Fittings and bushings shall be galvanized steel set screw type with two screws per connection for sizes over 2".

B. Galvanized rigid steel conduit and intermediate metal conduit shall be hot dipped galvanized inside and outside, in 10' lengths and threaded on both ends. Fittings and bushings shall be cast or malleable iron, and hot dipped galvanized inside and outside.

C. PVC conduit and fittings shall be Type DB for encasement in concrete for IT applications, Schedule 40 for direct burial, concealed and exposed work, and Schedule 80 in MV Duct Banks. Fittings shall be of the same type and from the same manufacturer as the conduit. PVC conduit shall be UL Labeled for 90 degrees C cables. Approved Manufacturers:
    1. Cantex
    2. Carlon
    3. National Pipe & Plastic.

D. Flexible metallic conduit shall be galvanized steel or aluminum. Fittings shall be of steel with cadmium or galvanized finish. Fittings shall be machine screw clamp type, single or two-piece. Self-locking, twist-in type fittings are not acceptable.

E. Liquid tight flexible metallic conduit shall consist of a flexible, galvanized steel core, a continuous copper ground strip and a polyvinyl chloride jacket. Fittings shall be steel liquid tight grounding type from the same manufacturer as the conduit.

2.02 CABLE TRAYS

A. Ladder type cable tray shall be aluminum, of the width shown, with 4" rail height, 13/16" minimum rung width, and 9" maximum rung spacing. The tray with a 10' span shall be capable of sustaining a working load of 145 pounds per lineal foot with a load deflection of 1.0" when tested in accordance with NEMA VE1-3.01. Approved Manufactures:
    1. B-Line
    2. Chalfant
    3. Cope
    4. Globetray
    5. Husky

6. Mono-Systems
7. Square D
8. Wiremold.

B. Center spline cable tray shall be aluminum, of the width shown,with top mounted rungs, 3” load depth, 13/16” minimum rung width, and 9” maximum rung spacing. The tray with a 10' span shall be capable of sustaining a working load of 145 pounds per lineal foot with a load deflection of 1.0" when tested in accordance with NEMA VE1-3.01.

C. Tray fittings including horizontal and vertical bends, tees, crosses, reducers, splice plates and expansion joints shall be from the same manufacturer and of the same product line as the tray. Bends, tees, crosses and reducers shall have a 13/16” minimum rung width, a 9" maximum rung spacing, and a 12" minimum bend radius.

D. Tray fasteners shall be galvanized or zinc plated steel.

2.03 SURFACE RACEWAYS

A. Where surface raceways are called for on the drawings, or when conduits in finished areas cannot be concealed in walls or above ceilings, surface raceways shall be used. Boxes and fittings shall match and be from the same manufacturer as the surface raceway.

B. Surface raceways shall consist of a base and cover, sized for the number of conductors contained within, complete with all connectors, fittings, bushings, boxes, covers and mounting hardware.

C. Raceways shall be 600 volt rated, and be in compliance with the applicable paragraphs of NEC Article 352.

D. They shall be non-flammable, and UL labeled, under UL 5, or UL 5A (as applicable).

E. The completed raceway system shall be vandal resistant.

F. Shall accept receptacles, cover plates, telephone/data outlets and other standard wiring devices as specified elsewhere in these specifications.

G. The coverplates used for wiring devices and telecommunication outlets shall be of the 'overlapping' type, and shall therefore cover the 'cut-end' of the raceway cover.

H. The raceways shall have "scuff" resistant finish, and the raceways shall be paintable.

I. All components of the raceway system exposed to view shall be of the same color and shade.

J. Barriers shall be provided when necessary to separate conductors of different voltages, or services.

K. Surface raceways shall be steel or plastic as noted below, and as noted on the drawings:

L. Type Standards Manufacturers

1. Metallic
    a. Metallic raceways shall be of .040" thick (minimum) zinc plated or galvanized steel.
    b. The acceptable levels of quality are, generically,
        1) Like "Wiremold V500 and V700" for smaller single channel raceway applications,
        2) Like "Wiremold V3000" for larger single channel raceway applications, and
        3) Like "Wiremold V4000" for larger multi-channel raceway applications.
    c. Manufacturers include Wiremold, Hubbell, Thomas and Betts, or Mono-System.
2. Plastic
    a. Plastic raceways shall be of a material meeting all of the requirements of UL 5A, (including flammability, resistively structural strength, etc.).

b. The acceptable levels of quality are, generically,
   1) Panduit LD series, or Carlon Series 30 for smaller single channel raceway applications;
   2) Panduit Type T-70, or Carlon "Premiere", for larger single channel raceways, and smaller multi-channel raceways; and
   3) Panduit Twin 70 or Carlon "Prestige", for larger multi-channel raceway applications.
c. Manufacturers include Panduit, Carlon, Hubbell, Mono Systems, and Wiremold.

M. Use vertical surface raceways from junction boxes above the ceiling, to the horizontal portion of the surface raceway. Locate vertical section as close to room corners (or 'vertical breaks' in mid wall) as is possible. Use of exposed vertical conduits is not acceptable.

2.04 BOXES

A. Boxes for fixtures, outlets, switches, equipment connections and wire pulling shall be

1. Cast or formed from carbon steel sheets of commercial grade steel not less than 14-gauge,
2. One-piece construction, zinc, or cadmium plated,
3. Tapped for mounting plates and covers as required.

B. Pull and junction boxes shall be

1. Fabricated from galvanized or painted code gauge cold rolled carbon steel sheets.
2. Welded construction with flat removable covers fastened to the box with machine screws.
3. Seams and joints shall be closed and reinforced with flanges formed of the same material from which the box is constructed or by continuous welding which will provide equivalent strength to flange construction.
4. Preferably not provided with 'knockouts'.

C. Box covers shall be fastened in place by machine screws or hinges and latches. Self-tapping or sheet metal fasteners are not acceptable.

2.05 SUPPORTS

A. Hangers and brackets shall be made of steel pipe, channel iron, angle iron or prefabricated steel channel. Prefabricated steel channel shall be by B-Line, Hilti, Powerstrut or Unistrut.

B. Anchors shall be lead shield anchors or plastic expansion anchors for small loads, and expansion or epoxy anchors for large loads. Powder-driven anchors shall not be used.

2.06 LABELS AND DIRECTORIES

A. Equipment nameplates shall be engraved .125 inch (1/8") thick 'Lanaloid' (Lanacoid) plastic. White, with black letters. The engraved letters shall be at least one quarter inch (¼") high.

B. Receptacles and lighting switch covers shall be labeled using clear adhesive backed nylon or Mylar tape with black text permanently laminated to the tape.

C. Panel directories shall be typed on supplied card stock with panel, or card stock similar in thickness and material as those supplied with the panels. Install supplied clear plastic cover, or one of like material.

PART 3 - EXECUTION

3.01 GENERAL

A. All work shall conform to all applicable Codes and Construction Standards.

B. All installations shall be warranted for a period of one (1) year against defects in material and workmanship.

C. The Owner reserves the right to relocate any device fifteen (15) feet prior to installation at no additional cost.

D. Material Storage

1. All materials shall be new and in original factory packaging.
2. All material shall be kept dry and clean.
3. The Owner reserves the right to reject any material not properly stored.

E. Contractor shall swab clean the interior of all raceway prior to pulling wire.

F. Device plate screw slots shall be oriented vertically.

3.02 RACEWAYS

A. Size conduits in accordance with the NEC, but not less than the sizes shown on the drawings. Minimum power, fire alarm and control conduit size shall be ¾". Minimum telecommunications conduit size shall be 1".

B. Install concealed and exposed conduits and cable trays parallel to or at right angles to building lines. Conduits shall not be embedded in concrete slabs except where specifically shown. Install surface raceways as close to room corners or trim features as possible to make the surface raceways less obvious.

C. Make directional changes in primary power distribution conduits above ground with sweeps and long radius elbows, and underground with 20' minimum radius bends.

D. Conceal conduits wherever possible and practical. When conduits cannot be concealed in finished areas, use surface raceways with matching boxes from the same manufacturer as the raceways.

E. Metal conduits, fittings, enclosures and raceways shall be mechanically joined together in a firm assembly to form a continuous electrical conductor providing effective electrical grounding continuity.

F. Provide expansion fittings at the intervals specified in the manufacturer's instructions.

G. Conduits entering panels located outdoors, in parking structures, in steam tunnels and on cooling towers shall enter from the sides, back, or bottom. Conduits shall not enter from the top.

H. Separate raceways from uninsulated steam pipes, hot water pipes, and other hot surfaces by a minimum of 4" horizontally or 12" vertically. Separate raceways from ventilation ducts and insulated pipes so that they do not come into contact with each other.

I. Low voltage signal circuits shall be separated or shielded from power circuits to prevent the induction of noise into the signal circuits.

J. EMT entering sheet metal enclosures and outlet boxes shall be secured in place by a connector with a locknut. Rigid conduit shall be secured with locknut inside and outside and a bushing. Sufficient thread on the connector or conduit shall extend into the enclosure so that the bushing will butt tight into the connector or conduit. Bushings shall not be used as jamb nuts or in lieu of locknuts.

K. Flexible metallic conduit to motors and similar equipment shall not exceed 3'-0" in length, and shall have adequate slack to absorb the maximum vibration. Flexible conduit connections to lighting fixtures shall not exceed 6'-0" in length.

3.03 MOUNTING HEIGHTS

A. Except where shown otherwise, install equipment and devices at the following heights:

1. Receptacles (Wall): 18" A.F.F. to center

2. Receptacles (Above Counter): 48" A.F.F. to center or 4” minimum above countertop or backsplash.
3. Receptacles (Unfinished Area): 48" A.F.F. to center
4. Surface Raceway Receptacle Strips: 42" A.F.F. to bottom
5. Light Switches: 48" A.F.F. to center
6. Telephone Outlets (Wall Phone): 48" A.F.F. to center
7. Telephone/Data Outlets: 18" A.F.F. to center
8. Clock Outlets: 88" A.F.F. to center
9. Fire Alarm Pull Stations: 45" A.F.F. to center
10. Fire Alarm Horn/Strobes: 80" A.F.F. to bottom or 1’ below finished ceiling whichever is lower.
11. Card Readers: 48" A.F.F. to card slot
12. Security System Controls: 48” A.F.F. to center
13. Thermostats/HVAC Controls: 48” A.F.F. to center
14. Panelboards: 72" A.F.F. to top
15. Safety Switches/Motor Starters: 72" A.F.F. to top (except top of handle shall not exceed 78" A.F.F.)
16. Motor Control Pushbuttons: 60" A.F.F. to center
17. Verify with the Owner for heights not otherwise listed.

3.04 SUPPORTS

A. Provide 4" thick concrete housekeeping pads for floor-mounted equipment.

B. Support all electrical items independently of supports provided by the other trades.

C. Support conduits and boxes using steel conduit straps or 1/4-inch minimum diameter threaded rod hangers. Suspended ceiling hangers or hanger wire shall not be used (except to support flexible metallic conduit and manufactured wiring systems).

D. Support cable trays with support brackets or 3/8" diameter minimum threaded rod hangers at intervals not exceeding 8'-0" for straight runs. Additional supports shall be provided at tray fittings.

E. Hangers shall be of sufficient strength that their deflection at mid span does not exceed 1/240 of the hanger span length after the cables are installed.

F. Route flexible metallic conduit, manufactured wiring systems and Type MC cable parallel to or perpendicular to building lines, and in a neat and workmanlike manner. Coil the excess manufactured wiring systems and Type MC cable, and support independently of the ceiling grid system at intervals not exceeding 3 feet.

3.05 PENETRATIONS, SLEEVES AND FIRE SEALS

A. Cut floor and wall penetrations neatly and to the minimum size required for installation of the equipment and raceways.

B. Provide galvanized steel pipe sleeves for all conduits penetrating floors, exterior walls and roofs.
1. Extend floor sleeves above the floor a minimum of 2 inches.
2. Embed sleeves in new concrete or step-core concrete and grout sleeves into existing concrete with epoxy grout.
3. Seal floor sleeves using fire-sealing systems approved by a Nationally Recognized Testing Laboratory.
4. Seal exterior wall and roof penetrations water tight.

C. Patch both sides of wall penetrations cut for electrical equipment and raceways to seal against the passage of air, sound and fire.
   1. Seal cable tray penetrations in fire rated walls using fire sealant bags approved by a Nationally Recognized Testing Laboratory.
   2. Seal conduit penetrations in fire rated walls using firesealing caulk approved by a Nationally Recognized Testing Laboratory.
   3. Seal conduit penetrations in non-rated walls using masonry materials that match the wall construction.
   4. Fire seal between recessed outlet boxes located on opposite sides of a fire rated wall if the box openings are over 16 square inches and the boxes are less than 24 inches apart.

3.06 EXPANSION FITTINGS

A. Provide expansion fittings at all building expansion joints.

B. Provide expansion fittings, in accordance with manufacture recommendations, in all areas subject to swings in temperature of more than 15 degrees C.

C. Install expansion fittings in all locations were expected expansion difference is ¼", or more, between boxes

3.07 IDENTIFICATION

A. Provide nameplates and labels in accordance with Article 2.6.
   1. Lanaloid labels shall be mechanically secured in place with sheet metal screws and/or bolts and nuts
   2. Labels shall be neatly centered. Place labels in like positions on similar equipment.

B. Color code wiring as noted in Section 26 05 19 3.01 B

C. Color code junction boxes and box covers of
   1. Emergency power circuits with red paint
   2. Fire alarm circuits with red paint.
   3. Temperature control circuits with blue paint.
   4. Phone and Data circuits with orange paint.

END OF SECTION 260500

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SELECTIVE ELECTRICAL DEMOLITION

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Demolition of electrical items and associated materials as indicated herein or as indicated on the drawings.

1.02 SECTION INCLUDES

A. Removal of designated equipment and devices.

B. Removal of designated construction.

C. Disposal or storage of removed materials.

D. Identification of utilities.

E. Refer to items as indicated.

1.03 SUBMITTALS FOR CLOSEOUT

A. Project Record Documents: Accurately record actual locations of terminated utilities and subsurface obstructions.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, safety of structure, dust control, products requiring electrical disconnection and re-connection.

B. Obtain required permits from authorities.

C. Do not close or obstruct egress width to any building or site exit.

D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

E. Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.05 SCHEDULING

A. Perform work between the hours of 7 a.m. and 7 p.m.

1.06 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied areas.

B. Maintain protected egress and access to the Work.

PART 2 – NOT USED

PART 3 – EXECUTION

3.01 PREPARATION

A. Protect existing materials which are not to be demolished.

B. Notify affected utility companies before starting work and comply with their requirements.

C. Utilize OSHA lockout/tag-out procedures for disconnecting means.

D. Label all wiring to remain (phase and device fed) to assure proper re-connection.

E. Mark location and termination of utilities.

3.02 DEMOLITION

A. Disconnect, remove, cap, identify designated utilities to remain and demolish in an orderly and careful manner.

B. Remove demolished materials from site except where specifically noted otherwise.

C. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

3.03 PROTECTION OF SALVAGED ITEMS

A. Remove, store and protect the materials and equipment scheduled to be re-used.

B. Protect wiring to be re-used by means of a Junction Box

1. Junction Box shall be of sufficient size to permit reconnection of existing wiring to new wiring per NEC Requirements.

2. In outdoor locations the junction box shall be NEMA 3R or a custom junction box with welded seams and gasketed cover.

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END OF SECTION 26 05 02

PART 1- GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of electrical wire and cable work is indicated by the Project drawings.

B. Types of wire, cable and connectors in this section include the following

1. 600 volt insulated copper conductors
2. Twist on insulated metal spring connectors
3. Compression connectors
4. Split Bolt connectors

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable of types sizes and ratings required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installers: Firm with at least five (5) years of successful installation experience with projects utilizing electrical wiring and cabling work similar to those required for this Project.

C. NEC Compliance: Comply with NEC requirements as applicable to construction, installation and color coding of electrical wires and cable.

D. U.L. Compliance: Comply with applicable requirements of UL Standard 83, “Thermoplastic-Insulated Wires and Cables”, and UL Standard 486A, “Wire Connectors and Soldering Lugs For Use With Copper Conductors”.

E. UL Labels: Provide wire, cable and connectors which are UL listed and labeled.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver wire and cable properly packaged in factory–fabricated type containers or wound on NEMA Specified type non-returnable wire and cable reels.

B. Store wire and cable in a clean dry space. Protect products from weather, damaging fumes, construction debris and traffic.

C. Handle wire and cable carefully to avoid abrading, puncturing, or tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wire and cable is maintained.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufactures offering products which may be used on this Project include, but not limited to, the following:

1. Low Voltage Wire:
    a. American Insulated Wire and Cable
    b. Southwire Company
    c. Others as Approved

2. Electronic Cable
    a. Belden
    b. Alpha
    c. Anixter
3. Twist on insulated metal spring connectors
    a. Ideal
    b. Thomas and Betts Corp
    c. 3M Company
4. Compression
    a. Square D / Anderson
    b. Thomas and Betts

2.02 DESCRIPTION THHN / THWN

A. Conductor:
    1. Bare, soft annealed copper per ASTM B-3.
    2. Sizes 14 - 10 AWG: Solid, bunched, unilay concentric combination unilay or compressed stranded (class C) alternate ASTM B-787, ASTM B-3 or ASTM B-8 and UL-83.
    3. Sizes 8 - 2 AWG: Concentric, compressed stranded (class C) alternate ASTM B-787, ASTM B-8, UL-83 and UL-1063.
    4. Sizes 1 AWG - 750 KCMIL: Concentric, compressed stranded (class B) ASTM B-8, UL-83 and UL-1063.
B. Insulation:
    1. High dielectric polyvinyl chloride (PVC) per UL-83 and UL-1063.
    2. Overall Jacket: Nylon per UL-83 and UL-1063.
C. Cable Identification:
    1. Ink print on jacket for Sizes 14 - 10 AWG (solid conductors): “(size) AWG Type THHN or THWN GAS AND OIL RES II 600V(UL) or AWM VW-1---(Company Name).---C-UL Type T90 NYLON or TWN 75”
    2. Ink print on jacket for Sizes 14 AWG - 750 KCMIL (stranded): “(size) AWG (or KCMIL) Type MTW or THHN or THWN or GAS AND OIL RES II 600V (UL) or AWM---(Company Name).---C-UL Type T90 NYLON or TWN 75.”
    3. Also “VW-1” and “FT1” on sizes 14 through 6 AWG and “for CT USE SUN RES” on sizes 1/0 AWG and larger in black.
D. Cables conform to the following standards:
    1. UL-83 for THHN-THWN, UL-1063 for MTW (stranded conductors only)
    2. Federal Specification J-C-30B, NEMA WC-5, UL-758 for AWM Styles 1316 through 1321, 1408 through 1414, 1452 and 1453.

2.03 ELECTRONIC CABLE - COMMUNICATION AND SIGNAL

A. Shall conform to the recommendations of the manufacturers of the communication and signal systems; however, not less than what is shown.

B. Wiring shown is for typical systems. Provide wiring as required for the systems being furnished.

C. Multi-conductor cables shall have the conductors color coded.

2.04 CABLES AND CONNECTORS

A. General: Provide electrical cables and connectors of Manufacturer's standard materials, as indicated by published product information.

B. Provide copper conductors with conductivity of not less than 98% at 68^0 F (20^0 C).

C. Electronic cable shall be Plenum rated and as recommended by the Equipment Supplier

D. Connectors shall be for copper to copper connections

E. Insulation: All connectors shall be fully insulated to match insulation type and rating of conductors being spliced.

PART 3 – EXECUTION

3.01 INSTALLATION OF WIRES AND CABLES

A. General: Install electrical cables, wires and wiring connectors as indicated, in compliance with applicable requirements of NEC, NEMA, UL and NECA's "Standard of Installations", and in accordance with recognized industry practices.

B. Feeder phase identification from left to right or front to back facing front of equipment shall be one of the following:

Phase A	Phase B	Phase C	Neutral	System
X	Y	Z	N	Any voltage
BLACK	RED	BLUE	WHITE	120/208 volt feeders
BROWN	ORANGE	YELLOW	GRAY	277/480 volt feeders

C. Install all wiring in conduit except as indicated on the drawings or directed by Owner.

D. Pull conductors together where more than one is being installed in a raceway.

E. Use pulling compound or lubricant where necessary. Compound must not deteriorate conductor or insulation. Use of soap is not permitted as a pulling lubricant.

F. Pulling means must not damage cable or raceway.

3.02 COMPRESSION CONNECTORS

A. Use only compression indenter tools designed for the type of connector used.

B. For multiple indentations start at center and indent outward.

3.03 FIELD QUALITY CONTROL

A. Prior to energizing, test all cables and wires with "Megger" to determine insulation resistance levels to ensure insulation integrity.

B. Prior to energizing, test wires and cables for electrical continuity and for short circuits.

END OF SECTION 26 05 19

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PART 1 - GENERAL

1.01 SUMMARY

A. Provide grounding for all systems and equipment.

1.02 GROUNDING SYSTEM REQUIREMENTS

A. Each ground rod shall have a maximum resistance to ground of 10 ohms before connection to the other ground rods. If reading is above 10-ohms, drive one extension. Further testing of that individual rod is not needed.

B. The total grounding system with all connections completed shall have a maximum resistance to ground of 2 ohms for primary services or 5 ohms for secondary services.

1.03 CONNECTION REQUIREMENTS

A. Provide exothermic weld type, or Burndy Hyground, ground connections for concealed, underground, and concrete encased ground connections, for ground connections to structural steel, connections between sections of the main ground bus and all connections to the substation room ground bus bars.

B. Exposed ground connections (except connections to structural steel and substation room ground bus bars) may be made with copper or bronze compression ground fittings or bolted compression ring lugs.

C. Provide exothermic weld type, or Burndy Hyground ground connections for splices and taps of grounding conductors No. 8 AWG and larger. Exposed splices and taps shall be taped.

PART 2 - PRODUCTS

2.01 GROUND RODS

A. Unless shown otherwise, ground rods shall be 3/4" diameter by 10' long, copper clad steel. Ground rods shall be capable of being extended when additional length is required.

2.02 GROUNDING CONDUCTORS

A. Grounding conductors for direct burial underground, for encasement in concrete, and for grounding of unit substations shall be No. 4/0 AWG minimum, bare, stranded copper.

B. Grounding conductors for general use shall be stranded, copper conductor, sized in accordance with the NEC unless shown otherwise on the drawings, and insulated with green NEC Type THHN insulation rated 90 degrees C, 600 volts.

2.03 GROUND CONNECTIONS

A. Ground connections shall be Burndy Hyground, Cadweld, Thermo-weld or Thomas & Betts Blackburn only.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Ground duct banks and manholes in accordance with Specification Section 26 05 13

B. Provide bare copper grounding conductors from duct banks, manholes, unit substations, primary switches, transformers, switchgear, panelboards, motor control centers and control panels to the building grounding system. Equipment rated above 480 volts or 600 amps shall be grounded by a minimum of two independent grounding conductors.

C. Bond transformer, UPS system, central battery/inverter system, emergency generator, and separately derived electrical system neutrals to the building grounding system.

D. Ground motors rated 460 volts and below by motor feeder equipment grounding conductors. Stranded copper grounding conductors connected to building steel shall also bond motors rated over 460 volts.

E. Provide green insulated equipment grounding conductors in all service, feeder, and branch circuits for connection of load devices to the power source ground. Raceways shall not be used as equipment grounding conductors.

F. Equipment grounding conductors shall not be daisy-chained.

G. Bond equipment-grounding conductors in boxes and enclosures where the grounding conductors are terminated or spliced.

H. Bond conduits, cable trays, wireways, surface raceways, boxes, and enclosures together, and to the building grounding system. Provide bonding bushings and bonding jumpers to bond conduits where they enter a box or enclosure.

I. Ground the lightning protection system with separate ground rods. The building grounding system ground rods shall not be used. After completion of both systems, the lightning protection system shall be bonded to the building grounding system.

J. Protect separately routed grounding conductors subject to damage or physical abuse by Schedule 40 PVC nonmetallic conduits. Grounding conductors shall not be routed in metallic conduits except when routed with phase conductors.

END OF SECTION 26 05 26

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies raceways and boxes for building and structure electrical systems under 600 volts.

B. Provide all labor, materials, and equipment as necessary to complete all work as indicated on the drawings, and as specified herein.

C. Related Sections:

1. Division 01 - General Requirements

2. Applicable sections of Division 26 - Electrical

PART 2 – PRODUCTS

2.01 GENERAL INFORMATION

A. All boxes, brackets, bolts, clamps, etc., shall be galvanized or electro-galvanized.

B. All hardware used outdoors shall be hot dipped galvanized.

2.02 CONDUIT

A. Rigid galvanized conduit shall be installed in poured concrete slabs, walls and partitions. Rigid or I.M.C. shall be installed in damp locations and inaccessible places.

B. All rigid conduit, I.M.C. and E.M.T. shall be hot dipped galvanized or electro-galvanized.

C. E.M.T. may only be installed exposed, above suspended ceilings, or in partitions.

D. Flexible steel conduit may be used for short runs to individual pieces of equipment.

E. Flexible sheathed metallic conduit shall be used for runs less than 6’ in length to individual pieces of equipment in mechanical rooms, penthouses, etc.

F. MC Cable is permitted in existing walls where installation of EMT is not possible to devices

G. No E.M.T. or aluminum conduit shall be used in concrete, direct burial or in corrosive locations.

H. Aluminum conduit may only be used in sizes 1-1/2 inch and larger. No aluminum conduit will be permitted in concrete. When aluminum conduit is used, all bends shall be galvanized steel.

I. Size and type of conduit shall comply with the National Electric Code. Where conduits are indicated on the drawing to be larger than required by Code, the larger conduit shall be used.

J. Minimum conduit size shall be 3/4 inch in all runs.

2.03 PULL AND JUNCTION BOXES

G. All pull boxes shall be galvanized sheet steel, sized as required, with thickness not less than no. 14 gauge.

2.04 OUTLET BOXES

A. All outlets, except as otherwise specified, shall consist of approved galvanized steel boxes of pattern adapted to the special requirements of each outlet, securely fastened in place in an approved manner.

PART 3 – EXECUTION

3.01 CONDUIT

A. Conduit shall be concealed in all new walls and run above suspended ceilings.

B. Use Wiremold type metal raceway where necessary to run exposed on existing walls and/or ceilings in finished areas as shown on the drawings.

C. All conduit shall be fastened or suspended from structural members, slabs, or walls only. It shall not be run on or fastened to tee bars of suspended lay-in ceilings.

D. All conduit shall be supported by approved hangers at spaced per NEC.

E. All exposed conduit shall be run parallel to the structural members of the building in a neat manner, securely fastened in place.

F. When metal conduit extends below the bottom of a slab on the ground, the slab shall be thickened in the area of the conduit so as to encase the conduit in concrete by at least 2 inches on all sides. The responsibility for and expense of this work shall be borne by the Contractor.

3.02 OUTLET BOXES

A. Recessed outlet boxes for single gang or 2-gang installations shall be 4” square with appropriate device ring or plaster ring for the required number of devices.

1. All device rings and plaster rings hall be installed vertically unless instructed otherwise by the A/E or Owner.

2. All plaster rings shall not extend past flush with wall surface or be recessed more than ¼” from wall surface.

3. For installations of more than two devices use the appropriate wall box for the number of devices required. If approved by the Owner the use of gangable wall boxes is allowed.

4. For surface installations in Mechanical Area or similar locations 4” square boxes shall be used with ¼” raised cover.

3.03 PULL AND JUNCTION BOXES

A. Pull boxes shall not be installed in inaccessible locations.

END OF SECTION 26 05 33

26 09 23
LIGHTING CONTROLS

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install a lighting control as specified and as shown on the contract drawings.

1.02 RELATED SECTIONS

A. Section 26 05 00 Common Work Results for Electrical

B. Section 26 05 19 Low Voltage Wire and Cable

C. Section 26 05 33 Raceway and Boxes

D. Section 26 51 00 Interior Lighting

1.03 SUBMITTALS -- FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Architect/Engineer and Owner

1. Manufacturer’s product cut-sheet

B. Submit electronically in PDF format.

1.04 SUBMITTALS -- FOR INFORMATION

A. When requested by the Engineer the following product information shall be submitted:

1. Descriptive bulletins

2. Product sheets.

B. Submit electronically in PDF format.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.06 OPERATION AND MAINTENANCE MANUALS

A. One (1) paper copy and one (1) USB flash Drive of the equipment operation and maintenance manuals shall be provided.

B. Operation and maintenance manuals shall include the following information:

1. Instruction books and/or leaflets

2. Recommended renewal parts list

3. Drawings and information required by section 1.06.

PART 2 – PRODUCTS

2.01 TIME CLOCK

A. Manufacturers

1. Paragon

2. Tork

B. Ratings

1. Like Paragon Model EC71st /120V Electronic Sun Tracker
2. 120 volt ac control voltage
3. Single Channel control
4. Contact Rating, 15 amp
5. NEMA 1 enclosure

2.02 PHOTOCONTROL

A. Manufacturers
1. Tork
2. Precision

B. Ratings

1. Weatherproof Lexan® housing
2. Photocell: 1 inch cadmium sulfide light sensitive element.
3. Turn on: 1 to 3 foot-candles. External light level slide allows field adjustment between 3 to 10 foot-candles.
4. Turn on / turn off ratio 1:3
5. Minimum 15 second time delay.
6. Single-pole, single-throw switch. Contact position at night normally closed.
7. Temperature Range -40 to 158 degree F
8. ½'-14 threaded stem.

2.03 LIGHTING CONTACTOR

A. Manufacturers
1. ASCO
2. Cutler Hammer
3. Square D

B. Ratings
1. 30 amp minimum
2. Number of poles as required
3. Control/coil voltage 120 volt
4. Electrical held
5. Installed in NEMA 1 enclosure or as required for location.

2.04 OCCUPANCY SENSORS

A. Wall Mounted

1. Wall Mounted occupancy sensors shall be a multi-technology (Ultrasonic & PIR) wall switch that turns lights on and off based upon occupancy and ambient light levels. Type 2 sensors shall contain two separate relays and manual override controls for dual level switching of light fixture. Sensors shall have built-in light level sensor, adjustable time delays, zero crossing switching, and smart technology. Provide necessary device box. Type 1 sensors shall be Hubbell Building Automation #LHMTS1 or pre approved equal. Type 2 sensors shall be Hubbell Building Automation #LHMTD2 or pre approved equal. Color of devices shall be as selected by owner but generally shall match color of wiring devices.

B. Ceiling Mounted

1. Ceiling Mounted occupancy sensors, indicated by OS on plans, shall be a multi-technology (ultrasonic & PIR) sensor that turns lights on and off based upon occupancy. Sensor shall have adjustable time delays, zero crossing switching, and smart technology. Provide necessary back-box. Sensor shall be Hubbell Building Automation #OMNIDT2000 or pre approved equal.

C. Power Packs and Relays

1. The power packs shall provide both the 24VDC power supply to operate sensors as well as the 20 amp line voltage relay to control the load. Power pack shall be mounted to a junction box located above accessible ceiling. Housing shall be plenum rated. Power packs shall be Hubbell Building Automation #UVPP Universal Voltage Power Pack, or pre approved equal.

2.05 WALL BOX DIMMERS

A. Wall box dimmers shall be Leviton Renoir II series or approved equal.

B. Shall be compatible with light fixture/driver and shall be capable of multi-location applications.

2.06 COMBINATION WALL BOX DIMMER AND OCCUPANCY SENSOR

A. Wall box device providing both digital PIR occupancy sensor and 0-10V dimming shall be Hubbell LHDMIRS-3 series or approved equal.

B. 3 buttons provide on/off, raise and lower light levels.

2.07 ELECTRONIC WALL BOX TIMERS

A. Timer shall be like Hubbell DT300 or Legrand TS-400

1. Multiple timer intervals
2. Energy code presets for Title 24, IECC, and ASHRAE 90.1
3. Visual and audio turnoff warning
4. 3 Way and Multiple Way Switching
5. No Neutral Required
6. No Load Requirement

B. Do not use in unconditioned spaces where temperature may fall below 30 degrees F.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

B. Protect the equipment from damage and keep clean and dry during construction.

C. **Installation of in wall switch replacement occupancy sensors must be approved by the Owner**.

D. Install power packs above accessible ceilings and locate near door to room. If space has no ceiling, install power pack within a minimum 4” square junction box and locate near the door to the room, as neatly as possible. Coordinate with manufacturer.

END OF SECTION 26 09 23

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PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the panelboards as specified and as shown on the contract drawings.

1.02 RELATED SECTIONS

A. Section 26 09 23 – Lighting Control System

B. Section 26 43 13 – Transient Voltage Surge Suppression

1.03 REFERENCES

A. The panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:

1. UL 67 – Panelboards
2. UL 50 – Cabinets and boxes
3. NEMA PB1
4. Fed. Spec. W-P-115C
5. Circuit breaker – Type I class I
6. Fusible switch – Type II class I.

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:

1. Breaker layout drawing with dimensions indicated and nameplate designation
2. Component list
3. Conduit entry/exit locations
4. Assembly ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
5. Cable terminal sizes
6. Product data sheets.

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in paragraph 1.04
2. Installation information
3. Seismic certification and equipment anchorage details.

B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

1.06 QUALIFICATIONS

A. The manufacturer of the panelboard shall be the manufacturer of the major components within the assembly, including circuit breakers and fusible switches.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 2.15g's (3.2–11 Hz), and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.

E. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.

1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.

2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.

3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.07 REGULATORY REQUIREMENTS

A. The panelboards shall be UL labeled.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.09 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

B. Submit electronically in PDF format

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Cutler-Hammer

B. Square D

C. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 RATINGS

A. Panelboards rated 240V AC or less shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 22,000 amperes RMS symmetrical.

B. Panelboards rated 480V AC shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 65,000 amperes RMS symmetrical.

C. Panelboards shall be labeled with a UL short-circuit rating. When series ratings are applied with integral or remote upstream devices, a label or manual shall be provided. It shall state the conditions of the UL series ratings including:

1. Size and type of upstream device

2. Branch devices that can be used

3. UL series short-circuit rating.

2.03 CONSTRUCTION

A. Interiors shall be completely factory assembled devices. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

B. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners.

C. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.

D. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.

E. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door.

F. All locks shall be keyed alike.

2.04 BUS

A. Main bus bars shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.

B. A system ground bus shall be included in all panels.

C. Full-size (100%-rated) insulated neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

2.05 BRANCH CIRCUIT PANELBOARDS

A. The minimum short-circuit rating for branch circuit panelboards shall be as specified herein or as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be like Cutler-Hammer type Pow-R-Line 1a, Pow-R-Line 2a or Pow-R-Line 3a.

B. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

C. Circuit breakers shall be thermal-magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame and through 100-ampere trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.

1. Circuit breaker handle locks shall be provided for all circuits that supply exit signs, emergency lights, energy management, and control system (EMCS) panels and fire alarm panels.

D. Circuit breakers shall have a minimum interrupting rating of 22,000 amperes symmetrical at 240 volts, and 42,000 amperes symmetrical at 480 volts, unless otherwise noted on the drawings.

2.06 DISTRIBUTION PANELBOARDS – CIRCUIT BREAKER TYPE

A. Distribution panelboards with bolt-on devices contained therein shall have interrupting ratings as specified herein or indicated on the drawings. Panelboards shall be fully rated Panelboards and shall be like Cutler-Hammer type Pow-R Line 3a or Pow-R-Line 4B. Panelboards shall have molded case circuit breakers as indicated below.

B. Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.

C. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

2.07 ENCLOSURE

A. Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

B. Enclosures shall be provided with blank ends.

C. Where indicated on the drawings, branch circuit panelboards shall be column width type.

2.08 NAMEPLATES

A. Provide an engraved nameplate for each panel section.

B. Owner shall provide label information

2.09 FINISH

A. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

PART 3 – EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

3.02 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

3.03 QUALITY CONTROL

A. Prior to energizing the Contractor shall:

1. Torque all connections per the Manufacturer's recommendations.

2. With a 1000 volt Megger test all phase and neutral bus for shorts and grounds.

END OF SECTION 26 24 16

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WIRING DEVICES

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Types and locations of wiring devices are indicated by the Project drawings.

B. Types of wiring devices in this section include the following

1. Receptacles
2. Switches
3. Cover plates

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of wiring devices, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installers: Firm with at least five (5) years of successful installation experience with projects utilizing wiring device work similar to those required for this Project.

C. NEC Compliance: Comply with NEC requirements as applicable to construction, installation and coding of wiring devices.

D. UL Labels: Provide wiring devices that are UL listed and labeled.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver wiring devices properly packaged in factory–fabricated type containers.

B. Store wiring devices in a clean dry space. Protect products from weather, damaging fumes, construction debris and traffic.

PART 2 – PRODUCTS

2.01 GENERAL

A. General use receptacles shall be heavy-duty 20-amp duplex 2 pole 3 wire grounding type.

B. All switches shall be specification grade quiet switches, 120-277 volt 15 amp.

C. Device colors shall be a selected by the Owner but generally all devices shall be white on painted walls and brown on wood walls unless for special application.

D. Devices on emergency circuits shall be red.

E. All exterior receptacles and any receptacle within six (6) feet of any water shall be GFCI.

2.02 MANUFACTURERS AND CATALOG NUMBERS

A. Hubbell, legrand, Leviton and Pass & Seymour are the only acceptable manufacturers.

B. The following is an approved list of receptacles by type (based on Hubbell).

1. 20 amp duplex- # HBL5362 or approved equal
2. 20 amp isolated ground- #IG5362 (orange) or approved equal
3. 20 amp single- # HBL5461 or approved equal
4. 20 amp duplex with two USB charging ports- # USB20X2 or approved equal
5. 20 amp GFCI - # GFR5362SG or approved equal

C. The following is the approved list of switches by type 15 amp (based on Hubbell).
   1. Single pole toggle switch-# HBL1201 or approved equal
   2. 2 pole toggle switch - # HBL1202 or approved equal
   3. 3 way toggle switch-# HBL1203 or approved equal
   4. 4 way toggle switch- # HBL1204 or approved equal
   5. Single pole key switch with key- # HBL1201L
   6. 2 pole key switch with key- # HBL1202L
   7. 3 way key switch with key- # HBL1203L
   8. 4 way key switch with key- # HBL1204L
   9. Maintained contact 3 position, 2 circuit, center off, single pole, double throw 20 amp- # HBL1385
   10. Momentary contact 3 position, 2 circuit, center off, 20 amp- # HBL1557

D. All interior device cover plates are to be polycarbonate type (thermoset plastic not allowed), color to match device color unless otherwise noted.

E. All exterior device cover plates shall be weatherproof type unless otherwise noted.

PART 3 - EXECUTION

3.01 INSTALLATION OF WIRING DEVICES

A. General: Install wiring devices as indicated, in compliance with applicable requirements of NEC, NEMA, UL and NECA's "Standard of Installations", and in accordance with recognized industry practices.

B. Install all wiring in approved boxes or enclosures.

C. For vertically install receptacles with ground up and on horizontal receptacles the ground on the left.

D. Verify proper orientation of all switches

E. Cover plates must cover all openings around devices and boxes.

F. All devices must be installed plumb with the surroundings

G. All device cover plate screws slots shall be vertical.

END OF SECTION 26 27 26

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less and spare fuse cabinets.

1.02 ACTION SUBMITTALS

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

B. Submit in PDF format

1.03 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Submit in PDF format per Section 017700

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Littelfuse, Inc.
4. Mersen.

2.02 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.03 SPARE FUSE CABINETS

A. Cabinet: Wall-mounted, 0.05-inch-thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

B. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.

C. Finish: Gray, baked enamel.

D. Identification: "SPARE FUSES" in 1-1/2-inch-high letters on exterior of door.

E. Fuse Pullers: For each size of fuse.

PART 3 – EXECUTION

3.01 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay.

B. Feeders, 600 A or Less: Class J, time delay.

C. Feeders, 601 A or Greater: Class L, time delay.

D. Motor Branch Circuits: Class RK1, time delay.

E. Other Branch Circuits: Class J, time delay.

F. Control Circuits: Class CC, fast acting.

3.02 INSTALLATION

A. Install fuses in fusible devices.

B. Arrange fuses so rating information is readable without removing fuse.

C. Install spare-fuse cabinet.

3.03 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 26 28 13

26 28 16
SAFETY SWITCHES

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low-voltage fused and non-fused switches as specified herein and as shown on the contract drawings.

1.02 REFERENCES

A. The switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards:

1. NEMA KS-1
2. UL 98

1.03 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:

1. Dimensioned outline drawing
2. Conduit entry/exit locations
3. Switch ratings including:
    a. Short-circuit rating
    b. Voltage
    c. Continuous current
4. Fuse ratings and type
5. Cable terminal sizes
6. Product data sheets

1.04 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:

1. Final as-built drawings and information for items listed in paragraph 1.04
2. Submit electronically in PDF format.

1.05 QUALIFICATIONS

A. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

1.06 REGULATORY REQUIREMENTS

A. The safety switches shall bear a UL label.

1.07 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer’s instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Cutler-Hammer

B. Square D

C. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 GENERAL DUTY SAFETY SWITCHES

A. Provide switches as shown on drawings with the following ratings:

1. 30 to 600 amperes
2. 240 volts AC maximum
3. 2 and 3-pole plus S/N
4. Fusible and non-fusible
5. Mechanical lugs suitable for aluminum or copper conductors.

B. Construction

1. Switch blades and jaws shall be visible and plated copper.
2. Switches shall have a black handle through 100A (except on plug-fuse type) that is easily padlockable with two 3/8-inch shank locks in the OFF position. Higher rating shall have a red handle that is easily padlockable with three 3/8-inch shank locks in the OFF position.
3. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position.
4. Switch assembly and operating handle shall be an integral part of the enclosure.
5. Switches rated 100A to 600A shall have reinforced fuse clips.
6. Switch blades shall be readily visible in the ON and OFF position.
7. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type (except 30A plug-fuse type).
8. Fusible switches shall be suitable for service entrance equipment and be equipped with factory installed neutrals.
9. All switches (except 30A plug-fuse type) shall have side opening doors. Door padlocking capability shall be provided.
10. Suitable for systems capable of 100kA with Class R Fuses (except 30A plug-fuse type).
11. Double-make, double-break switch blade feature shall be provided (except 30A plug-fuse type).
12. 30A to 100A shall have R fuse rejection capability (not applicable to plug-fuse type).
13. All switches shall be manufactured in the USA..

C. Enclosures

1. All enclosures shall be NEMA 1 general purpose unless otherwise noted.
2. Other types, where noted, shall be:
    a. NEMA 3R rainproof
    b. NEMA 1 plug fuse indoor
3. Paint color shall be ANSI 61 gray.

4. 30A to 60A NEMA 1 enclosures shall have tangential knockouts on the top, bottom, and sides of the enclosure. NEMA 3R enclosures shall have tangential knockouts on the bottom and sides. (Not applicable to NEMA 1 plug-fuse type).

2.03 HEAVY-DUTY SAFETY SWITCHES

A. Provide switches as shown on drawings, with the following ratings:

1. 30 to 1200 amperes
2. 250 volts AC, DC; 600 volts AC (30A to 200A 600 volts DC)
3. 2, 3, 4, and 6 poles
4. Fusible and non-fusible
5. Mechanical lugs suitable for aluminum or copper conductors.

B. Construction

1. Switch blades and jaws shall be visible and plated copper.
2. Switches shall have a red handle that is easily padlockable with three 3/8-inch shank locks in the OFF position.
3. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position. Defeater mechanism shall be front accessible.
4. Switch assembly and operating handle shall be an integral part of the enclosure base.
5. Switches rated 30A to 600A shall have reinforced fuse clips.
6. Switch blades shall be readily visible in the ON and OFF position.
7. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type. Bail type mechanisms are not acceptable.
8. Fusible switches shall be suitable for service entrance equipment.
9. Switches shall have line terminal shields.
10. Suitable for systems capable of 200 kA at 480V with Class J, L, R, or T fusing as applicable.
11. Embossed or engraved ON-OFF indication shall be provided.
12. Double-make, double-break switch blade feature shall be provided.
13. Fuse pullers shall be provided on all NEMA 4X and 12 switches through 200A.
14. Renewal parts data shall be shown on the inside of the door.
15. All switches shall be manufactured in the USA.

C. Enclosures

1. All enclosures shall be NEMA 1 general purpose unless otherwise noted.
2. Other types, where noted, shall be:
    a. NEMA 3R rainproof
    b. NEMA 4 watertight (800A max.)
    c. 30A to 200A – 304 stainless steel
    d. 400A to 800A – 304 stainless steel
    e. NEMA 12 dust-tight and oil-tight special industry (800A max.).
3. Paint color shall be ANSI 61 gray.
4. 30A to 100A NEMA 4, 4X, and 12 enclosures shall be provided with draw-pull latches.

D. The following factory modifications are to be included:

1. Phenolic nameplates
2. Class R fuse clips factory installed

2.04 NAMEPLATES

A. Nameplate shall be front cover mounted, containing a permanent record of switch type, ampere rating, and maximum voltage rating.

PART 3 – EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.02 INSTALLATION

A. The equipment shall be installed per the manufacturer's recommendations.

END OF SECTION 26 28 16

PART 1 – GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install the low voltage motor starters as specified herein and as shown on the contract drawings.

1.02 REFERENCES

A. The motor starters shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA, ANSI and UL.

1.03 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:
   1. Master drawing index
   2. Dimensioned outline drawings
   3. Conduit entry/exit locations
   4. Cable terminal sizes
   5. Wiring diagrams
   6. Nameplate schedule
   7. Ratings including:
      a. Voltage
      b. Horsepower and/or continuous current
   8. Product data sheets.

1.04 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in paragraph 1.04
   2. Wiring diagrams
   3. Seismic certification.

B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

C. Submit electronically in PDF format

1.05 QUALIFICATIONS

A. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

C. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for Zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 2.15g’s (3.2–11 Hz), and a ZPA of 0.86g’s applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.

D. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.

1. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon approved shake table tests used to verify the seismic design of the equipment.

2. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.

3. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.06 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Cutler-Hammer

B. Square D

C. Allen Bradley

D. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 MANUAL MOTOR CONTROL

A. Single-Phase Manual Starters

1. Manual single-phase starters 1 hp or smaller shall be Cutler-Hammer type MS starters or approved equal. The starter shall have a quick-make/quick-break toggle mechanism. The overload shall have a field adjustment allowing up to +/- 10% variance in ratings of the nominal heater value.

2. Manual single-phase starters above 1 hp shall be Cutler-Hammer type B100 or approved equal. The starter shall have quick-make/quick-break mechanism. The closure of the contacts shall be blocked while the line terminals are exposed. The operating handle or button shall clearly indicate whether the unit is ON, OFF or TRIPPED.

3. The enclosure shall be as indicated on the contact drawings.

B. Three-Phase Manual Starters

1. The starter shall have quick-make/quick-break operating mechanism
2. The operating handle or button shall clearly indicate whether the unit is ON, OFF or TRIPPED.
3. The closure of the contacts shall be blocked while the line terminals are exposed.
4. The enclosure shall be as indicated on the contract drawings.
5. Manual three-phase motor starters shall be Cutler-Hammer type B100 or equal.

C. Three-Phase Manual Motor Starter and Protector

1. The starter shall have an adjustable Class 10 ambient compensated integral overload relay and a fixed magnetic short-circuit trip mechanism designed to trip at twelve (12) times the maximum current rating of the starter.
2. The starter shall be UL listed and CSA certified for group motor installations with 1200 ampere maximum fuse and circuit breaker ratings at 480V AC.
3. The starter shall have provisions for padlocking in the OFF position.
4. The starter shall have accessories such as auxiliary contacts, trip alarm, undervoltage release, and shunt trip available for field installation.
5. The enclosure shall be general purpose NEMA 1.
6. Motor starter and protector shall be Cutler-Hammer type A302 or equal.

2.03 ELECTROMECHANICAL MOTOR CONTROL

A. Non-Reversing Starters

1. Magnetic starters through NEMA Size 9 shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring. Each starter shall have one (1) NO auxiliary contact.
2. Coils shall be of molded construction through NEMA Size 9. All coils to be color-coded through Size 5 and permanently marked with voltage, frequency and part number.
3. Solid-State Overload Relay
    a. Provide a solid-state overload relay for protection of the motors. The relay shall be Cutler Hammer type CEP7 or approved equal.
    b. The overload relay shall provide high accuracy through the use of state-of-the-art microelectronic packaging technology. The relay shall be suitable for application with NEMA Size 1 through Size 7 motor starters.
    c. The overload relay shall be modular in design, be an integral part of a family of relays to provide a choice of levels of protection, be designed to directly replace existing electromechanical overload relays, and be listed under UL Standard 508.
    d. The overload relay shall have the following features:
        1) Be self-powered
        2) Class 10 or 20 fixed tripping characteristics
        3) Manual or automatic reset

4) Phase loss protection. The relay shall trip in 2 seconds or less under phase loss condition when applied to a fully loaded motor
5) Visible trip indication
6) One NO and one NC isolated auxiliary contact
7) Test button that operates the normally closed contact
8) Test trip function that trips both the NO and NC contacts
9) A current adjustment range of 3.2:1 or greater
10) Ambient temperature compensated
11) Ground fault protection. Relay shall trip at 50% of full load ampere setting
12) Jam/Stall protection. Relay shall trip at 400% of full load ampere setting, after inrush.

4. NEMA Size 00 through 2 starters shall be suitable for the addition of at least six (6) external auxiliary contacts of any arrangement normally open or normally closed. Size 3 through 8 starters shall be suitable for the addition of up to eight (8) external auxiliary contacts of any arrangement normally open or normally closed.
5. Motor starters shall be Cutler-Hammer Freedom Series or approved equal.

B. Reversing Starters

1. Reversing starters shall consist of two (2) contactors and a single overload relay assembled together. The contactors shall be mechanically and electrically interlocked to prevent line shorts and the energizing of both contactors simultaneously.
2. Magnetic starters through NEMA Size 8 shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring.
3. Coils shall be of molded construction through NEMA Size 8. All coils to be color-coded through Size 5 and permanently marked with voltage, frequency and part number.
4. Solid-State Overload Relay
   a. Provide a solid-state overload relay for protection of the motors. The relay shall be Cutler Hammer type CEP7 or approved equal.
   b. The overload relay shall provide high accuracy through the use of state-of-the-art microelectronic packaging technology. The relay shall be suitable for application with NEMA Size 1 through Size 7 motor starters.
   c. The overload relay shall be modular in design, be an integral part of a family of relays to provide a choice of levels of protection, be designed to directly replace existing electromechanical overload relays, and be listed under UL Standard 508.
   d. The overload relay shall have the following features:
      1) Be self-powered
      2) Class 10 or 20 fixed tripping characteristics
      3) Manual or automatic reset
      4) Phase loss protection. The relay shall trip in 2 seconds or less under phase loss condition when applied to a fully loaded motor
      5) Visible trip indication
      6) One NO and one NC isolated auxiliary contact
      7) Test button that operates the normally closed contact

8) Test trip function that trips both the NO and NC contacts
9) A current adjustment range of 3.2:1 or greater
10) Ambient temperature compensated
11) Ground fault protection. Relay shall trip at 50% of full load ampere setting
12) Jam/Stall protection. Relay shall trip at 400% of full load ampere setting, after inrush.

5. NEMA Size 00 through 2 starters shall be suitable for the addition of at least six (6) external auxiliary contacts of any arrangement normally open or normally closed. Sizes 3 through 8 starters shall be suitable for the addition of up to eight (8) external auxiliary contacts of any arrangement normally open or normally closed.
6. Motor starters shall be Cutler-Hammer Freedom Series or approved equal.

C. Two-Speed Starters

1. Magnetic starters through NEMA Size 6 shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring.
2. Coils shall be of molded construction through NEMA Size 6. All coils to be color-coded through Size 5 and permanently marked with voltage, frequency and part number.
3. Solid State Overload Relay
   a. Provide a solid-state overload relay for protection of the motors. The relay shall be Cutler Hammer type CEP7 or approved equal.
   b. The overload relay shall provide high accuracy through the use of state-of-the-art microelectronic packaging technology. The relay shall be suitable for application with NEMA Size 1 through Size 7 motor starters.
   c. The overload relay shall be modular in design, be an integral part of a family of relays to provide a choice of levels of protection, be designed to directly replace existing electromechanical overload relays, and be listed under UL Standard 508.
   d. The overload relay shall have the following features:
      1) Be self-powered
      2) Class 10 or 20 fixed tripping characteristics
      3) Manual or automatic reset
      4) Phase loss protection. The relay shall trip in 2 seconds or less under phase loss condition when applied to a fully loaded motor
      5) Visible trip indication
      6) One NO and one NC isolated auxiliary contact
      7) Test button that operates the normally closed contact
      8) Test trip function that trips both the NO and NC contacts
      9) A current adjustment range of 3.2:1 or greater
      10) Ambient temperature compensated
      11) Ground fault protection. Relay shall trip at 50% of full load ampere setting
      12) Jam/Stall protection. Relay shall trip at 400% of full load ampere setting, after inrush.

4. NEMA Size 00 through 2 starters shall be suitable for the addition of at least six (6) external auxiliary contacts of any combination of normally open or normally closed contacts. Sizes 3 through 6 starters shall be suitable for the addition of up to eight (8) external auxiliary contacts of any combination of normally open or normally closed contacts.
5. Two-speed magnetic starters for motors up to 400 hp, 600 volts shall be Cutler-Hammer Freedom Series type AN700 or approved equal.

2.04 ELECTROMECHANICAL REDUCED VOLTAGE MOTOR CONTROL

A. Autotransformer Type

1. The starter shall utilize an autotransformer for a reduced voltage start. The autotransformer shall have adjustable voltage taps at 50%, 65% and 80%
2. The starter shall be an open transition type
3. The autotransformer shall use electromechanical type starters.

B. Part-Winding Type

1. The starter shall utilize a part winding connection for a reduced voltage start.
2. The starter shall be an open transition type.
3. The part-winding starter shall use electromechanical type starters.

C. Wye-Delta Type

1. The starter shall utilize a wye-delta connection for a reduced voltage start.
2. The starter shall be an open transition type.
3. The wye-delta starter shall use electromechanical type starters.

2.05 ENCLOSURES

A. The enclosure shall be as indicated on the contract drawings.

B. Starters shall have an adjustable instantaneous motor circuit protector (HMCP) type disconnect device.

2.06 OPTIONS

A. Each starter shall be equipped with a fused control power transformer (100 VA minimum)

B. HOA selector switch

C. Red LED “run” pilot light

D. 2 NO/2 NC auxiliary contacts

PART 3 – EXECUTION

3.01 FACTORY TESTING

A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

B. The manufacturer shall provide certified copies of factory test reports in PDF Format.

END OF SECTION 26 29 13

26 51 00
INTERIOR LIGHTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General, Supplementary, and Special Conditions apply to all lighting installations.

B. Section 26 05 00 Common Work Results Electrical

C. Section 26 05 33 Raceway and Boxes

D. Section 26 05 19 Low Voltage Wiring

E. Section 26 09 23 Lighting Controls

1.02 REQUIREMENTS OF WORK

A. The Basic Electrical Requirements apply to all electrical materials, equipment, installations and services supplied under Dimmer package.

B. The Electrical Contractor shall obtain a Bill of Materials from the Lighting Supplier(s) listed herein or proposed for substitution. The Bill of Materials shall be submitted with the Contractor's bid and shall include, but not limited to, the following.

1. All lighting fixtures
2. All fixture accessories
3. Number, fixture type and luminaire type to be provided

C. The Electrical Contractor (Sub-Contractor) and the Lighting Supplier(s) are responsible for the installation of a complete and operating lighting system in accordance with the intent of the Contract Documents.

1.03 SUBMITTALS

A. The following items shall be submitted for approval prior to ordering.

1. Lighting Fixtures

B. All submittals shall be submitted electronically in PDF format

1.04 INSTALLER QUALIFICATIONS

A. A firm with at least five (5) years of successful installation experience on projects with electrical works similar to this project.

PART 2 – PRODUCTS

2.01 FIXTURE SCHEDULE

A. See fixture schedule on Drawings.

PART 3 – EXECUTION

3.01 GENERAL

A. All equipment shall be installed in a workmanlike manner and shall conform to industry Standards for this type on installation.

B. All fixtures shall be plumb and square with ceilings and walls

C. Support for fixtures in or on a grid type ceiling. Use grid for support.

1. Install grid support wires on all four corners of each fixture.
2. Install support wires or support chains, minimum of two, independent of the ceiling grid to each fixture not more than 6 inches from the corner on diagonally opposite corners of each fixture.

D. Flange mounted fixture installation shall be per Manufacturer's instruction.

3.02 TESTING

A. "Megger" all wiring prior to energizing.

B. Test all switches and sensors for proper operation

C. Verify proper operation of each fixture.

D. Test each emergency fixture by interrupting the power to the fixture.

3.03 CLOSEOUT

A. Prior to final acceptance and Project closeout the Contractor shall:

1. Clean all fixtures and lenses inside and outside
2. Replace any burned out lamps or LED arrays.

3.04 WARRANTY

A. As Specified on each individual fixture listed herein.

B. In lieu of a specific fixture warranty, all parts and labor on this Project shall be warranted for a period of one (1) year after start-up and Owner acceptance.

END OF SECTION 26 51 00

Revised 11/18/2019

GENERAL REQUIREMENTS FOR COMMUNICATIONS

PART 1 GENERAL REQUIREMENTS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. The following items are additional requirements for Division 27 "Communications" Work.

B. If after reviewing all documents and drawing there is any questions or doubt, or if a conflict or discrepancy is found between the documents and the drawings, contact the Owner in writing for clarification before proceeding. Clarification will be issued by Addendum.

C. Each Item below has the Division 01 00 00 specification section number (in parenthesis) of the article where the base requirements are found. The additional requirements are to be considered additive to the Division 01 00 00 section and apply only to Division 27 work.

D. Each Division 27 Specification Section may add additional requirements specific to that Section.

1.3 REQUIREMENTS

A. (01 25 00 Substitution Procedures)

1. Substitutions

a) All products provided as Work of this Project shall be in compliance with, and meet the physical, functional, and operational requirements of the products as outlined in Part II of each Division 27 specification Section.

b) Product Substitutions

1) Substitution requests must be received by the Owner as required by Division 1.

2) No substitutions will be accepted without prior approval. Only changes issued in an Addendum will be allowed.

3) See Substitution Submission below.

c) Standard of Quality

1) A Standard of Quality will be set by applying a Manufacturer and Catalog number to each item in Part II of each applicable specification section.
2) A standard of quality item has the physical, functional, and operational attributes to provide the designed functionality.
3) Additional approved manufacturer(s)
    i) Listing as an additional approved manufacturer for an item is not an assurance that the manufacturer has products that meet the requirements; at minimum, the written description must be met along with any key attributes used in the Project design.
    ii) When a listed "additional manufacturer" has a product that meets the written description and has the physical, functional, and operational attributes, that product may be used in place of the product that was listed as the standard of quality without submission for prior approval.
        (A) If such a substitution is made, the requirements for items by the "same manufacturer" shall be adhered to.
            (1) Requirements for "system" type warranties requiring the same manufacturer or manufacturing "partnership" items for warranty application shall be adhered to.
        (B) It will be the sole responsibility of the Contractor to provide adequate design compensation for fulfillment of the intent of the Specification for any change in Scope due to an "approved manufacturer's" product change from this Section (i.e., required rack space, box size, support requirements, etc.).
            (1) Adequate compensation shall be determined by the Owner.
4) Where 2 or more Manufacturers and Catalog numbers are listed, one of the two products must be utilized. Item listed first is Owner's preferred product.

B. (01 25 13 Product Substitution Procedures)
1. Substitution Submission
    a) Each item submitted must meet the physical, functional, and operational attributes of the Standard of Quality item.
    b) All requests for substitutions shall be accompanied by a complete system brochure and/or individual product data sheets.
        1) Contractor shall state a reason for the substitution request (i.e. familiarity, availability, functionality, Brand specific training, Manufacturer's warranty issue, etc.)

2) Contractor shall provide comparison list of features, functions and specifications where proposed substitute product differs from specified product.
3) Each request must reference the Specification Section number and paragraph and include a description of any deviation from the specified functional requirements of the equipment and/or system(s).
4) A demonstration of the proposed equipment and/or system(s) may also be requested. This information must be submitted in compliance with Division 1 Section "Substitutions."

c) Failure to provide all information may result in the substitute product being rejected.
d) Owner reserves the right to reject any substitute.

2. Substitution Responsibility
   a) Contractor shall be responsible for all additional costs, both direct and indirect, including costs for additional equipment, materials and labor necessary to properly integrate a substitute product, including additional costs which may be incurred by other trades, the Owner, Architect or Owner. (i.e., required rack space, box size, support requirements, etc.).

C. (01 26 13 Requests for Interpretation)
   1. Contradictions, discrepancies, or conflicts
      a) This Contractor shall carefully study and compare the Contract Documents and shall at once report to the Authority as set forth in 01 31 00 "Project Management and Coordination" any error, inconsistency or omission discovered.
      b) In the case of a contradiction, conflict, or discrepancy between Division 27 Sections and Divisions 0 and/or 1.
         1) Division 27 Specifications will be considered additive. It is not intended that Division 27 Sections supersede any legal or contractual requirements set forth in Division 0 or 1.
      c) In the case of a contradiction, conflict, or discrepancy between T Series Drawings and/or Division 27 Specification Sections
         1) If during the Bid period the Contractor discovers a contradiction, discrepancy, or conflict of information on any Drawing, between any two drawings, between Drawings and specification Sections, within any Division 27 Section, between related Sections, between individual parts of a Section, or within any part of any Section; the contradiction, discrepancy, or conflicting information shall be called to the attention of the Owner in writing and will be clarified by Addendum.
         2) A contradiction, discrepancy, or conflict of information that has not been clarified in writing at Bid time will be considered to be the more costly of the available options.

3) If a contradiction, discrepancy, or conflict of information is discovered after award of Contract; the discrepancy or conflict will be submitted to the Owner in writing for evaluation. The result will be clarified by a Change Order. This Change Order will be of $0 or will require a deduct to change the requirement to a less costly option if so decided by the Owner.
   i) If Contractor performs any construction activity knowing it involves a recognized contradiction, discrepancy, or conflict in the contract documents without such notice to the Owner or Owner, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the cost required for correction.

D. (01 31 13 Project Coordination)
   1. Coordination
      a) Coordination shall commence immediately upon award of contract. Failure of this contractor in coordinating (including providing and extracting related information to and from other trades for review) in a timely manner, shall not result in any subsequent additional reimbursement, special allowances or additional construction time being made for any facet of the project. Work fabricated or installed before properly coordinating with all other trades shall be done at the Contractor's own risk.
      b) Sequence, coordinate, and integrate installations of communications materials and equipment with the Division 26 electrical contractor any all other applicable trades for efficient flow of the Work.
      c) The contract document drawings are an outline to indicate the approximate location and arrangement of required work. The drawings shall be followed as closely as possible in coordination and in execution of the work.
      d) This contractor shall work in harmony with all building contractors and sub-contractors, so as not to cause any delays in pouring concrete, building masonry walls, etc. This contractor shall consult the Architectural, Plumbing, HVAC and Structural plans in all instances before installing his work so that his work will not interfere with those branches.
      e) This contractor shall participate in coordination efforts and in preparation of coordination drawings prior to fabrication or installation of any equipment, materials, etc. Coordinate actual clearances of all installed equipment.
      f) Conflicts in equipment and materials shall be corrected prior to installation. Should there be a conflict with the drawings of other trades, this contractor shall work with the trades to correct the conflict while coordinating the project (prior to installation). If the conflict cannot be resolved, refer the matter to the owner's representative for a final decision as to method or material. This contractor shall refer to drawings of all other trades for details, dimensions and locations of other work and route their work so as not to conflict with any other branch. Any work installed or equipment

placed in position by this contractor creating a conflict shall be readjusted to the satisfaction of the owner's representative at the expense of this contractor.

g) Plans are diagrammatic indicating design intent and indicating required size, points of termination and, in some cases, suggested routes of raceways, etc. However, it is not intended that drawings indicate fully coordinated conduit routing, all necessary offsets, etc. All cable assemblies, etc. shall be run as straight as possible and symmetrical (perpendicular to or parallel with) with architectural items and in a consistent elevation. Work installed diagonal to building members shall not be permitted.

h) The Contractor shall coordinate his work with all other trades and locate equipment accordingly. This Contractor shall refer to coordination drawings of the other trades. Any communications work fabricated or installed before the above referenced coordination with all other trades shall be done at the respective contractors' risk.

i) It is intended that all apparatus be located symmetrical with architectural elements and shall be installed at exact height and locations as shown on architectural drawings. If a device height or location is in question it shall be the responsibility of this Contractor to immediately seek clarification from the Owner.

E. (01 31 16 Multiple Contract Coordination)

1. Coordinate work with Division 26 Contractor (where applicable); prior to Division 26 Contractor's installation of outlet boxes, conduit, conduit stubs, raceways and any other provisions in support of Division 27 Contractor’s work.
2. Coordinate with all other Contractor’s and the Owner, as applicable and necessary to ensure a clean, professional looking and operating systems.

F. (01 31 19.16 Site Mobilization Meetings)

1. The Contractor shall fully inform himself regarding all peculiarities and limitations of space available for installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. Although the locations of equipment and conduit may be shown on the drawings in certain positions, the architectural details and conditions existing at the job site shall guide the Contractor, coordinating his work with that of others. Provide all offsets as required to provide a neat workmanlike arrangement

G. (01 33 23 Shop Drawings, Product Data, and Samples)

1. Submittals required after Award of Contract but before starting Work include:
   a) Complete BOM list
      1) BOM shall include the following information for each product:
   b) Product Information Sheets “Datasheets”: Include catalog information, sizing, and technical data on each item to be used on the Project.

1) Each product datasheet must reference the specific paragraph for which the product is being submitted. Each product must be listed in the exact same order as it appears in the Section for which the products are being submitted.
   i) Datasheets shall each include a clearly identifiable label applied in upper corner of each sheet that clearly references the specification section and drawing (as applicable) to which it applies. Labels shall be consistently affixed in the same location on all sheets unless the labels will obstruct pertinent technical information.
2) All datasheets shall be original manufacture datasheets, first generation printed copies of manufacturer's electronic datasheet (i.e. printed copy of a PDF file), or high quality photocopy of original manufacturer's datasheets.
   i) Fax versions of product datasheets or any photocopies thereof are not acceptable.
   ii) Submit original printing or "clean" reproductions.
3) Where datasheets depict multiple products, versions or options, the Contractor shall highlight (indicate with an arrow) all applicable model(s), version(s) and option(s) applying to the specific product the Contactor will be providing. Exact catalog number must be indicated. The submitted items must be from "approved materials" as specified in each Specification Section.
4) Product datasheets shall be "approved" by the Owner before delivery to the Project site. Any product not approved through the submittal process is at the sole risk of the Contractor.
   i) A copy of "Approved" datasheets shall be included in O & M manual requirements
5) Required Information
   i) Complete Bill of Materials (BOM) List
      (A) The manufacturer's name (Brand) and full model number shall be used. (Distributor and Contractor assigned names and model numbers are unacceptable).
   ii) Manufacturer Product Datasheet for each product.
      (A) Product datasheets shall be manufacturer originals, or first generation printed versions of manufacturer's official electronic product sheets.
      (B) Manufacture model shall be highlighted on each sheet.
      (C) Datasheets shall be organized to match the order and organization of this section

2. Submission Format
   a) Submit Shop Drawings and Product Data Sheets in a bound form
      1) Submittals shall be supplied in an appropriately sized 3-ring binder(s). Separate binders shall normally be used for each Division 27 Contract.
      2) Manuals shall be bound in hard cover, 3 ring binders with clear plastic "pocket" covers to insert Project Information on the exterior of the Binder.
      3) Maximum individual Binder spine size shall be 3"; utilize multiple binders as required.
   b) Submittal Manuals shall include the information listed below and be assembled as follows:
      1) Binder shall be marked on the cover and spine with the following information
         i) Project Information
            (A) Title of Project
            (B) Name and address of Owner, Contractor, Architect, Owner
            (C) "Submittals for " (specification Section(s)
            (D) Date of Submittal
      2) Organization
         i) The binder is subdivided into specification sections.
         ii) Each Binder shall be organized as follows
            (A) Master Tab 1: Project and contact information
            (B) Master Tab 2: (First) Specification Section
               (1) Section 1: Title Page
               (2) Specification section name & number
               (3) Contractor/Subcontractor Information Including:
               (4) Name, address and phone
               (5) Project manager name and phone
               (6) Section 2: Bill of Materials
               (7) Section 3: Product Datasheets
               (8) Section 4: 11 x 17 inch reduced scale versions of full size shop drawings. Drawings shall be folded, punched and inserted into the binder.
            (C) Master Tab 3 through (x): Additional Specification Section(s)
               (1) Repeat Sections 1-5 above for each Specification Section.
         iii) Division 27 submittals may not be combined with submittals from any other Division.
      3) Full-size shop drawings shall be printed to scale and bound along the left edge of the drawings with the Title block on the right edge.
      4) The Contractor shall provide a record of shop drawings using AutoCAD Release 2000 or higher.

i) Detail drawings may be submitted in Visio 2000 format.

3. Submission
   a) Provide minimum of (5) copies of all submittal items.
      1) Two copies of all Submittals will be retained by the Owner.
      2) Three copies will be returned.
         i) One copy of approved Submittals will be required to prepare Record Drawing for the O&M (Owner's) Manual.
         ii) One Copy for the Project site
         iii) One Copy for the Contractor's records
      3) Provide additional quantities as may be required by other applicable sections (including Division 1), as requested by the Owner, and as required by the Contractor for its own purposes.
   b) Timetable
      1) Contractor shall make all Submittal submissions as soon as practical after award of Contract.
      2) Provide submittals in adequate time so as not to negatively impact the completion of the project or the schedule of other trades.
         i) Contractor shall allow a minimum of 2 weeks in its schedule for the Owner's review of submittals.
4. Review of shop drawings does not relieve the Contractor of responsibility for correct ordering of material and equipment. Contractor review should ensure that equipment will fit in available space.
   a) PARTIAL OR INCOMPLETE SUBMITTALS WILL BE REJECTED PRIOR TO FULL REVIEW.
   b) Unacceptable submittal items:
      1) Fax copies of datasheets
      2) Datasheets that are not legible.
      3) Datasheets that do not clearly depict and/or enumerate all specification requirements.
      4) Non-manufacture datasheets (i.e. from a distributor)
      5) HTML web page printouts that are not the manufacturer's official product datasheet.
      6) Identification of products by Contractor or Distributor assigned part numbers, catalog numbers or private label brand names.

H. (01 41 13 Codes)
1. Building Codes:
a) National Electrical Code (NFPA 70)
b) Life Safety Code (NFPA 101)
c) Uniform Building Code (Or adopted State Code)
d) Federal Communications Commission (FCC) Part 68
e) State specific agencies:
1) Administrative Building Council
2) State Board of Health
3) State Fire Marshal
f) Local Codes (City, County, etc.)
g) Local Utility Company requirements

I. (01 41 26 Permits)
1. Contractor shall obtain and pay for all permits or certificates of inspection and approval required for his branch of the work.
a) Permits shall be posted in a prominent place at the building site properly protected from weather and physical damage.

J. (01 42 16 Definitions)
1. Wherever the words "Contractor", "This Contractor" or "Subcontractor" appears in Division 27 specifications, it shall refer to the Division 27 Communications Contractor (or Subcontractor of the Communications Contractor where applicable).
2. A reference to Owner shall be referring to the Owner's Representative involved in the design of the System(s). The Owner may or may not be affiliated with the Architect and or Engineer for the Project. All information exchanged between the Contractor(s) and the Owner shall be within the information exchange process of the Project. (i.e. through a Construction Manager, General Contractor, Architectural Firm, etc.)
3. Wherever the words "Designer", "Consultant" or "Engineer" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean the specifying authority responsible for the creation of the Division 27 specifications and related drawings.
4. Wherever the word "Install" appears on the drawings or in these Division 27 specifications it shall mean to supply all labor, tools and incidental materials necessary to handle, store, mount, terminate, program, configure and adjust product as necessary to fulfill project requirements.
5. Wherever the word "Provide" appears on plan drawings or in Division 27 specifications, it shall be interpreted to mean that the Contractor shall "Furnish

and Install", including all necessary accessories, miscellaneous materials and labor necessary to render the respective system fully operational.

6. Wherever the word "Work" appears in Division 27 specifications or on communication technology drawings, it shall be interpreted to mean any and all labor, materials, accessories, services, etc. necessary to fulfill project requirements.
7. Wherever the word “Furnish” appears on the drawings or in these Division 27 specifications it shall mean to supply the specified labor or specified product (context dependant), including all associated shipping, storage and warranty expenses.
8. Wherever the words “Site”, “Project Site”, or “Premises” appears in Division 27 specifications or its related drawings, it shall be interpreted to mean all real estate, buildings and structures where work will be performed and where products will be installed and reside.
9. Wherever the phrase “or Approved equal” appears in Division 27 specifications or its related drawings, the contractor shall interpret this to mean that pre-bid approval of specific models of equipment is required before submission of the Contractor’s bid.
10. Wherever the phrase “or Equal from”, or “or Equal by” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the Contractor may supply any product manufactured by the given list of manufacturer’s meeting or exceeding the overall quality, functional, technical performance, construction, finish and general fit and fitness as the “Standard of Quality” design product. The final authority as to whether a product is equal shall remain with the Owner. Pre-bid approval is highly recommended.
11. Wherever the phrase “Additional Approved Manufacturer(s)” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the Contractor may supply any product manufactured by the given list of manufacturer’s meeting or exceeding the overall quality, functional, technical performance, construction, finish and general fit and fitness as the basis of design product. The final authority as to whether a product is equal shall remain with the Owner.
12. Wherever the phrase “Standard of Quality” appears in Division 27 specifications or its related drawings, the Contractor shall interpret this to mean that the listed Manufacturer and Catalog number for each item has the physical, functional, and operational attributes to provide the designed functionality.
13. Substantial Completion:
    a) The point at which the following has been completed:
        1) All specified work, and;
        2) All punch-list items that affect the full and complete use of the system, and;
        3) Successful acceptance testing by the Owner, and;

4) Successful inspection and demonstration of the work to the Owner's representative, and;
5) Contractor's delivery of a request for "Letter of Substantial Completion"
   i) The request shall include the Specification Section(s) completed, confirmation of completion of the items listed above, and the requested Substantial Completion date (no more than 7 calendar days prior to this Letter).
6) Contractor has received a Letter of substantial Completion for the Owner.

14. Nominal Operating Levels: The standard signal voltage/power reference level which a manufacturer has designed its product's inputs and outputs to operate at to achieve the manufacturer's specified performance levels.
15. Wherever the words "This Division" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean these Division 27 specifications and all of its related drawings.
16. Wherever the words "Low Voltage", or "Low-Voltage" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean less than or equal to 70.7 volts, AC or DC.
17. Wherever the words "High Voltage", or "High-Voltage" appears in Division 27 specifications or its related drawings, it shall be interpreted to mean greater then 70.7 volts, AC or DC.

K. (01 43 00 Quality Assurance)
1. Quality Assurance
   a) Requirements
      1) Contractor shall have a minimum five (5) years experience in the installation of Communication Technology system(s) of similar size, type, scope and contract value.
      2) The Prime Contractor or his subcontractor responsible for this Section shall have a Registered Communications Distribution Designer (RCDD) on staff that will be ultimately responsible for this Project. The RCDD must have sufficient experience in this type project as to be able to lend adequate technical support to the field forces during installation, the warranty period, and any extended warranty periods or maintenance contracts. If in the opinion of the Owner, the RCDD does not possess adequate qualifications to support the Project, the Owner reserves the right to require the Contractor to assign an RCDD who, in the Owner's opinion, possesses the necessary skills and experience required of this Project.
      3) The lead technician(s) on the Project shall carry a current BICSI Technician Certificate or have five years of experience in projects of similar scope.

4) The lead technician(s) on the Project shall have a thorough understanding of the following:
   i) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 568B Commercial Building Telecommunications Cabling Standard.
   ii) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and spaces.
   iii) American National Standards Institute/Telecommunications Industry Association – ANSI/TIA/EIA 606 The Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.
   iv) American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
5) Contractor shall be a (factory trained) certified installer for all connectivity products.(cable and terminations).
   i) This minimum requirement shall apply to each Division 27 section independently. If Contractor is incapable of meeting the percent of product value requirement for each section, Contractor shall use a Subcontractor that can meet the percent of product value requirement, in whole, for all products and work of that section for which This Contractor is not qualified.
   ii) The specific Contractor or Subcontractor meeting the requirements for a specific section shall be responsible for the supply of the products, supplemental engineering services and submittals as well as performing all technical labor associated with the installation, training and warranty servicing of work of that section.
6) Contractor shall have substantial business operations located within a 100 mile radius of the project site with a full-time employee staff actively engaged in the supply, installation and service of systems and equipment of the type and scope herein specified.
7) Contractor shall have full-time employee service staff based within a 100 mile radius of the project site.
8) Contractor shall provide any additional information requested by the Owner as determined appropriate by the Owner to validate a Contractor's (or its Subcontractor's) ability to perform and warranty the specified work in the quality, manner and time frame required.
9) In the absence of a requirement to provide a performance bond the Designer reserves the right to require a financial disclosure of the

Contractor and any Subcontractor for the purpose of aiding the Designer in determining the ability of the Contractor or Subcontractor to perform.

10) Designer reserves the right to disqualify the use of any Subcontractor that This Contractor plans to use if the Subcontractor fails to meet the quality assurance requirements. Should this occur, This Contractor shall be required to choose another Subcontractor that does meet these quality assurance requirements.
    i) An equipment vendor not performing the technical labor associated with installation of the work of a given section shall not be considered a Subcontractor.
11) Superintendent/Project Manager
    i) This Contractor shall furnish the services of an experienced superintendent/Project Manager who shall be constantly in charge of the work, together with the qualified Foremen and specialists as required to properly install, connect, adjust, start, operate and test the work involved.
    ii) The superintendent's/Project Manager's qualifications shall be subject to the review and acceptance by the Owner/Owner. Unless the Owner/Owner grants prior special permission, the same communication Superintendent/Project Manager shall be utilized throughout the duration of the project and be responsible for the complete scope of the Contract.

b) Documentation to be submitted upon request pre or post bid for evaluation includes:
    1) A complete material list by specification section for each specification section:
        i) Include description, the manufacturer being used, and the manufacturer's part number.
        ii) Submission of this list does not constitute acceptance by the Owner or relieve the Contractor from providing approved items in the proper quantities to fulfill the Scope of this Project.
    2) References:
        i) A minimum of five reference accounts at which similar work, both in scope and design for each system specified, has been completed by the Contractor within the last four years.
            (A) The list shall include contact names and telephone numbers for each.
            (B) Each listed Project shall include a Summary of Work.
            (C) Each listed Project shall include initial and final contract amounts.
            (D) Each listed Project shall include initial Contract award date and completion date.

(E) Each listed Project shall identify the name of Contractor's project manager and lead technician responsible for the project.

3) List of test equipment:
   i) Proposed equipment for use in verifying the installed integrity of copper and fiber optic cable systems on this Project.
4) Technical resume:
   i) Provide experience of the Contractor's Superintendent/Project Manager and onsite installation supervisor (Foreman) who will be assigned to this Project.
5) List of technical product training:
   i) Training attended by the Contractor's personnel that will be working on this Project.
6) Subcontractors list for Work of this Project.
   i) List Scope of Work for each Subcontractor
   ii) List References for each subcontractor
   iii) Technical resume as described above for each subcontractor
   iv) List of technical product training as described above for each subcontractor.
7) Each specification section may detail additional Quality Assurance requirements in the PART I, Quality Assurance paragraph.
   i) Submit each item identified in each Specification Section.
      (A) Manufacturer Certification documentation as requested in each Section.
8) Documentation substantiating the Contractor's factory authorization and warranty service status for all products specified and all other major products proposed for use by the Contractor.
9) Financial Disclosure.

c) Failure to supply a complete quality assurance submittal; failure to supply accurate references or references which yield favorable performance marks; or failure to supply other quality assurance information required shall be taken as a statement of the Contractor's inability to perform and shall be grounds for the Owner and/or Owner to reject the Contractor's bid.

L. (01 62 00 Product Options)

1. The contract documents are prepared on the basis of a single specific product as the "design equipment," even though other manufacturers' names and models may be listed as acceptable, or equal. The first manufacturer make and model for each product is the "design equipment" or "Standard of Quality".

   a) This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.

   b) This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items

listed in the Products section that are not required under the scope of this contract.

c) Project design is based on the "Standard of Quality" listed products' physical, functional, and operational attributes. The use of any product not listed as the Standard of Quality must be compared for full functionality to the listed Product.

d) When several materials, products or items of equipment are specified by name for one use, the first item shall be considered Owner's preferred product. Contractor may select any one of those specified for requested approval. It shall be the responsibility of the Contractor to provide an item that meets or exceeds the qualities and functional characteristics of the device specifically listed by brand name and model number.

e) The Contractor is responsible for any other ancillary changes required to meet the Project objectives when utilizing substitutions. Approval of items submitted during the submittal process does not relieve the Contractor of this responsibility.

2. Product acceptability and substitutions are determined by criteria as required this section under "Substitutions".

3. Materials installed shall be new, full weight and of the best quality. All similar materials shall be of the same type and manufacturer. All materials, apparatus and equipment shall bear the Underwriter's Laboratory, Inc. label where regularly supplied, or required by Code.

4. In the event that a specified product is discontinued by the manufacturer and is no longer available for purchase, the Contractor shall provide replacement product of equal or greater value, performance and function. The replacement product shall be from the same manufacturer as the specified equipment unless written approval to use an alternate manufacture is obtained from the Owner.

M. (01 65 00 Product Delivery Requirements)

1. Product Procurement

a) The Contractor shall not procure, deliver or install any product until after the contractor's submittal has been reviewed by the Owner and the submittal has been returned to the Contractor's marked "No Exceptions", "Exceptions Noted" or "Exceptions Noted, Submit Record Copy" or "Approved". Advance procurement, delivery or installation of product prior to the return of submittal is entirely at the Contractor's own risk. Contractor should schedule its work and procurement accordingly.

b) Prior to procurement of any equipment or materials, Contractor shall review the model numbers, compatibility and interoperability of all products.

c) Prior to procurement, Contractor shall, through coordination with other trades and through field measurements and project site inspections, verify that products to be supplied can be physically installed as planned.

d) No claim for additional payment will be considered for the return of any equipment determined incompatible, or procured without adhering to the aforementioned conditions, including claim for reimbursement of manufacturer's "restock" fees.

e) Contractor shall factor all of these conditions into its bid and plan its scheduling and resource needs accordingly to ensure that all work shall be performed according to the Owner's schedule and requirements of this contract.

N. (01 66 00 Product Storage and Handling Requirements)

1. Product Delivery, Storage and Handling

a) Receipt of materials

1) The Contractor is responsible for receiving, handling, storing, and protecting all materials used on this Project until Substantial Completion.

b) Upon request, submit a schedule of equipment and materials required to complete installation, quantity ordered, order date, and promised delivery date.

c) Deliver equipment and materials in accordance with factory shipping requirements.

1) Pack components in factory-fabricated protective containers.

2) Units shall be delivered in sections of such size as will pass through available openings.

d) Until ready for installation, store products in original factory containers.

1) Products shall be stored in a clean, dry space and as additionally recommended by the product manufacturer.

2) Keep products out of the weather and away from construction traffic and debris, including drywall finish dust.

3) Do not exceed structural capacity of the floor or platform on which the products are stored.

e) Until final acceptance of the system, protect all supplied products from damage resulting from moisture, fumes, dirt, dust and debris or any other source of potential damage.

f) Handle all products with care before, during and after installation so as to prevent damage.

1) Replace any products damaged prior to final acceptance with new replacement products.

i) Replacement shall be done at not charge to the owner.

2) Contractor is responsible for the safety and good condition of the materials and equipment installed until final acceptance by the Owner.

g) Save original product shipping containers and related packaging materials for major products until final acceptance.

1) Prior to disposal, check with owner to determine if the owner wishes any of the packaging materials.

2) Deliver specified packaging materials to the owner as requested.

O. (01 71 00 Examination and Preparation)

1. Examination of the Site

a) Contractor shall visit the Site to familiarize himself with the local conditions under which the work is to be performed and correlate his observations with the requirements of the Contract Documents. No allowance shall be made for claims for concealed conditions which the Contractor, in exercise or reasonable diligence in observations of the Site and review of the local conditions under which the work is to be performed, learned or should have learned of, unless otherwise specifically agreed by Owner and Owner in writing.

b) Before ordering any materials or doing any work, the Contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement or size indicated in the drawings or specifications. Any discrepancies found shall be submitted in writing to the Project Manager and Owner for consideration before proceeding with the work.

c) This Contractor must verify all dimensions locating the work and its relation to existing work, all existing conditions and their relation to the work and all man made obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the Contract Documents.

P. (01 73 19 Installation)

1. Work and workmanship

a) Provide all required labor, materials, equipment and Contractor's services necessary for complete installation of systems required to comply with the requirements of authorities having jurisdiction, as indicated on Drawings, and as specified.

b) Work shall be functional and complete in every detail, including any and all items required to complete the system, whether or not these items have been enumerated or shown on the Drawings.

c) Special attention shall be given to access to working and controlling parts. Adjustable parts shall be within easy reach. Removable parts shall have space for removal.

d) Each Contractor shall be fully knowledgeable of the details of all Work to be performed by other trades and take necessary steps to integrate and coordinate his Work with other trades.

e) Wherever tables or schedules show quantities of materials, they shall not be used as a final count. These figures serve only as a guide for the Contractor. Each Contractor shall be responsible for furnishing all materials on the Drawings or as specified.

f) The Consultant and Owner's Representative have full power to condemn or reject any Work, materials or equipment not in accordance with these Specifications and Construction Drawings or the manufacturer's specifications or drawings approved by the Owner or Consultant.

g) Work or equipment that is rejected shall be removed and replaced to the satisfaction of the Owner at the Contractor's expense. Work or equipment that is rejected shall be so stated in writing by the Owner or Consultant.

h) Such decisions that the Owner or Consultant may make with respect to questions concerning the quality, fitness of materials, equipment, and workmanship shall be binding upon the parties thereto.

i) All Work shall fully comply with these specifications and related Drawings and all manufacturers recommended installation practices.

j) All Work shall be performed with the best practices of the trade for performance, functionality, safety, endurance, and aesthetics.

k) Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.

l) Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible, as appropriate to the application.

m) Set all equipment to accurate line and grade, level all equipment and align all equipment components.

n) Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.

o) No equipment shall be hidden or covered up prior to inspection by the owner's representative. All work that is determined to be unsatisfactory shall be corrected immediately.

p) All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.

q) Install all equipment and materials in strict accordance with manufacturer's written instructions. Bring any conflicts between the manufacturer's written instructions and these specifications to the attention of the Designer for recommendations.

r) Upon completion of installation of equipment and communication circuitry, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with re-testing.

Q. (01 73 29 Cutting and Patching)

1. Where demolition of existing surfaces are required by the Work, the same shall be restored to at least as good a condition as they were before.
2. Contractor shall be responsible for painting, patching, repairing and replacing any building surface, furnishing, wall/floor/ceiling covering that is damaged or penetrated in the process of performing work on the project site.
3. Additional work required to repair work performed under this Contract shall be at the expense of This Contractor.
4. The Division 27 contractor shall do all cutting as required for the admission of Division 27 work. Unless directed otherwise in field, provide all related patching and painting to match surrounding methods, materials and colors. Any damage done by this contractor to the building during the progress of this contractor's work shall be made good at this contractor's expense. Perform cutting, fitting, and patching and materials as required to:
   a) Uncover Work to provide for installation of ill-timed Work.
   b) Remove and replace defective Work.
   c) Remove and replace Work not conforming to requirements of the Contract Documents.
   d) Remove samples of installed Work as specified for testing.
   e) Install equipment and materials in existing structures.
   f) Upon written instructions from the owner's representative, uncover and restore work to provide for observation of concealed work by owner's representative or by inspection authority having jurisdiction.
   g) During cutting and patching operations, protect adjacent installations (structure, finishes, furnishings, etc.). Where applicable, provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to system components and components of other trades.
   h) Patch surfaces and building components using new materials matching existing materials and using experienced Installers. Refer to Division 1 for definition of experienced "Installer" or determine qualifications as directed in field by owner's representative.
   i) Patching through fire rated walls and enclosures shall not diminish the rating of that wall or enclosure. All materials used for patching shall be installed to meet or exceed the smoke and fire rating of the respective surface being patched.
   j) Neatly cut and drill all openings in walls and floors required for the installation. Secure approval of Owner's Representative before cutting and drilling in existing facilities. Neatly patch all openings cut.
   k) Cutting and patching shall be held to a minimum by arranging with other contractors for all sleeves and openings before construction is started.
   l) Provide factory-assembled watertight wall and floor seals, of types and sizes required; suitable for sealing around conduit, pipe, or tubing passing through

concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.

m) Pipe sleeves shall be fabricated from Schedule 40 rigid, heavy wall, full weight galvanized steel pipe; remove burrs. Use sleeves which are two standard sizes larger than conduit passing through respective sleeve.

n) Provide sleeve seals for piping which penetrates foundation walls below grade, exterior walls or roofs, caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal. Elsewhere modular provide mechanical type seals, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

o) Install standard Schedule 40 black steel pipe sleeves two sizes larger than pipes passing through floors, bearing walls, fire walls and masonry construction. Sleeves through walls shall be cut flush with both faces. Sleeves through floor shall extend one inch above floor top elevation. Pipes penetrating roof shall use a pipe curb assembly equal to Pate Co. Furnish and set all forms required in masonry walls or foundation to accommodate pipes.

5. Grout

   a) Provide non-shrink, nonmetallic grout, premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications.

6. General Joint Sealer Application

   a) Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

   b) Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

   c) Clean all affected surfaces, joints, etc. immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

   d) Apply sealant primer to substrates as recommended by manufacturer. Protect adjacent areas from spillage and migration of sealant, using masking tape. Remove tape immediately after tooling without disturbing seal.

   e) Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

   f) Comply with recommendations of ASTM C 962 for use of elastomeric joint sealers.

   g) Comply with recommendations of ASTM C 790 for use of acrylic-emulsion joint sealants.

h) Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

i) Colors for exposed seals shall be as selected by the Owner's representative from manufacturer's standard colors.

7. Elastomeric Joint Sealers

a) One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.

b) One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes. Silicone Sealant shall be equal to the following:

1) "Dow Corning 790", Dow Corning Corp.
2) "Gesil N SCS 2600", General Electric Co.
3) A/D Fire Protection Systems.

8. Acrylic-Emulsion Sealants

a) One-part, non-sag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications or interior and protected exterior locations involving joint movement of not more than plus or minimum 5 percent. Subject to compliance with requirements, provide one of the following:

1) "Chem-Calk 600", Bostik Construction Products Div.
2) "AC-20", Pecora Corp.
3) "Sonolac", Sonneborn Building Products Div.
4) "Tremco Acrylic Latex 834", Tremco, Inc.

R. (01 74 16 Site Maintenance)

1. During the progress of the work, the Contractor shall clean up after his men and leave the premises and all portions of the building in which he is working in a clean and safe condition. This cleaning shall occur on a daily basis.

S. (01 74 23 Final Cleaning)

1. Clean all parts of the apparatus and equipment. Exposed parts, which are to be painted, shall be cleaned of cement, plaster and other materials and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all corners and cracks scraped out.

T. (01 77 16 Final Closeout Review)
   1. Project Closeout
      a) Contractor shall meet all provisions of Substantial completion as defined earlier in this section and in each related section.
      b) Final Payment
         1) Final payment of contract will not be made until receipt, review and acceptance, by the owner's representative, of all of the following:
            i) Substantial Completion
            ii) Completion of all punch-list items.
            iii) Approved submittals, including shop drawings;
            iv) Owner's manuals;
            v) Record documentation;
            vi) Certification of warranty;
            vii) Certificate of final acceptance signed by the Owner and the Owner;
            viii) Copies of all training sign-in sheets, signed by owner's representative;
            ix) Signed delivery receipt indicating that the owner has received all training recordings produced to-date;
            x) All additional applicable closeout provisions of Division 1;
      c) 100% of all closeout documents shall be supplied within 30 calendar days following the substantial completion.

U. (01 77 19 Closeout Requirements)
   1. Acceptance Testing
      a) Upon the Designer's receipt of and approval of the Contractor's pre-test submittal, the Contractor shall contract the Designer to schedule acceptance testing. Contractor shall allow not less then 10-business days of advance notice to the Owner.
      b) In the presence of the Owner, the Contractor shall demonstrate the presence of all specified products, cabling and installation methods. The Contractor shall demonstrate the operation of the system (and any requested sub-component thereof) and shall be prepared to make any electronic, physical or software related adjustments to the system or any of its sub-components to the satisfaction of the Owner, as required to achieve full compliance with the specifications.
      c) The contactor shall have available at the project site all test equipment, cables, tools and personnel necessary to demonstrate full compliance with these specifications as determined necessary by the designer.
      d) During the acceptance testing the Contractor shall have a clean and fresh copy of the contractor's most up-to-date as-built record documentation, printed to scale.
      e) This Contractor shall provide all required labor services required to completely verify and test the systems in the presence of the Owner.

f) Verify that each system, as a whole system, meets these Specifications and complies with all applicable standards.

g) Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense.

h) Should the Owner be required to return to the project site to perform acceptance testing more the once for any system the Contractor shall be responsible for all costs, up to $1500 per day, plus travel and expenses, for each return trip to the project site. Payment of this may be required before final payment will be authorized.

2. Supplemental Engineering Services

a) This Contractor is responsible for all supplemental engineering services specifically outlined in these specifications and otherwise required for the completion of the work specified. Contractor shall estimate its costs accordingly, taking into account all information provided.

b) In the event that the Owner is required to provide additional services as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, or if the Owner is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Owner's expenses in connection with such additional services shall be paid by the Contractor and may either be deducted from any monies owed to the Contractor, or billed to the contractor, entirely at the discretion of the Owner. The contractor shall be billed at prevailing hourly rates.

c) In the event that the Owner is required to provide additional services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Owner is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Owner's expenses in connection with such additional services shall be paid by the Contractor. Costs will be calculated based upon the Owners prevailing rates.

V. (01 78 13 Completion and Correction List)

1. Owner shall be furnished with a certificate of final inspection and approval prior to final acceptance of this branch of the work.

W. (01 78 36 Warranties)

1. Warranty Period

a) Specified materials and workmanship provided shall be fully guaranteed by the Contractor for one year from the transfer of title via notice of substantial completion against any defects in materials or workmanship.

i) Extended (additional) warranty(ies) may be required and will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.

ii) Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Warranty by the Contractor but may exceed the Contractor's Warranty Period.

2) Manufacturer's Warranties shall also begin on Substantial Completion; not on purchase of equipment or delivery of equipment to the site.

b) The Warranty shall begin upon Substantial Completion.

1) Note: Delivery of closeout documents is not a conditional requirement to commencement of the warranty.

2. This warranty shall in no manner cover equipment that has been damaged or rendered unserviceable due to negligence, misuse, acts of vandalism, or tampering by the Owner or anyone other than employees or agents of the Contractor.

a) The Contractor's obligation under its warranty is limited to the cost of repair of the warranted item or replacement thereof, at the Contractor's option.

b) Insurance covering said equipment from damage or loss is to be borne by the Contractor until full acceptance of equipment and services.

3. Individual specification sections may have additional warranty requirements for the work in that section. The warranty above will cover all materials and work where not covered by an extended warranty listed in the individual specification section.

4. Warranty Coverage

a) Specified materials and workmanship provided shall be fully guaranteed by the Contractor against any defects in materials or workmanship.

1) Contractor shall provide a full "System Warranty" which shall cover all materials, labor and related product shipping expenses for a period of five years from the date of Owner acceptance.

i) Supplied products with manufacturer's warranties of less than the System Warranty term shall be extended by the Contractor for the full specified term

2) During this period the Contractor will remedy (at no cost to the owner) any problem with the system, or any of its related components that is the result of defective materials, settings, workmanship, or loss or programming.

3) Any defective items or work shall be removed and replaced at the Contractor's expense to the satisfaction of the owner's representative and the Owner.

4) During the Warranty Period, the Contractor shall respond by phone within four (4) business hours of notice by the owner of a problem. Within (1) business day or (72) contiguous hours, which ever comes first, the Contractor shall have qualified personnel onsite to remedy the problem if the problem cannot be quickly be remedied over the phone.

i) The contractor shall make available to the owner on-call emergency response service labor to the Owner. Cost for

emergency service labor during the warranty period shall not exceed the Contractor's published emergency service rates, or two-times its standard rate, whichever is lower.

5) The period of the Contractor warranty(ies) for any items herein are not exclusive remedies, and the Owner has recourse to any warranties of additional Scope given by the Contractor to the Owner and all other remedies available by law or in equity.

6) Additional Warranty requirements may be added by an individual Specification Section.

i) Scope of these extended (additional) warranty(ies) will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.

ii) Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Contractor Warranty by the Contractor.

(A) Manufacturer's Warranties shall also begin on Substantial Completion; not on purchase of equipment.

X. (01 78 39 Project Record Documents)

1. Project Record Document requirements for Division 27 "Communications" shall be described in Section 27 01 00 "Operation and Maintenance of Communications Systems".

Y. (01 79 00 Demonstration and Training)

1. Training

a) Proper operation in many cases is a function of adequate training of key users on new systems.

1) Each Division 27 section may specify special Training requirements.

i) Training requirements will be for a quantity of hours, allow for multiple trips.

2) If no special requirements are specified in the individual section, allow for 4 hours and 2 trips to provide basic overview, operation and maintenance information.

3) Each Specification Section will indicate any training criteria specific to that Section.

4) Train Owner's maintenance personnel on the procedures and schedules involved in operating, general troubleshooting, and preventative maintenance of the system.

5) All training sessions shall be audio and video recorded. Recordings shall be supplied in DVD formats and playable on standard consumer grade reproduction equipment. Recordings do not need to be professionally edited but shall have intelligible audio and a clear image of the subject trainer and any supplemental visual content critical to the training.

6) Recordings shall be turned over and signed for by an owner's representative at the end of each training session.
7) Contractor shall require all attendees to sign-in for each training session. The sign-in form shall summarize the training to be conducted, specification section and subsection being trained on, as well as the starting time and duration of training. Following training, a representative of the owner shall sign the form, acknowledging the same. Contractor shall retain the original copy of these forms and turn over a photo copy of the form to the owner's representative as evidence of training. Training conducted without this official record of training shall not be considered as part of the Contractor's training obligation.

b) Schedule training with the Owner's representative, at least 14 days in advance.

c) Contractor shall assume training will be conducted in a minimum of (2) separate sessions, on non-contiguous days and will require separate trips to the project site, and should be bid accordingly.

d) Owner shall have the right to use its allocated training for a period of 365 calendar days following acceptance of the system.

END OF SECTION 27 00 10

Revised 11/20/2019

OPERATION AND MAINTENANCE OF COMMUNICATIONS SYSTEMS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. Basic materials, methods and installation guidelines applicable to the installation of all communication systems.
      a) This Section is a "Common Work Results" Section that includes information that is applicable and "Related" to all Division 27 Sections.

B. Related Sections
   1. All Division 27 Sections.

C. Related Drawings
   1. All Technology (T-Series) Drawings

1.3 RECORD DOCUMENTS FOR COMMUNICATIONS SYSTEMS

A. The Operations and Maintenance Manual (Owner's Manual) paragraph below details the basic information required to be documented.

B. Each specification section will detail applicable additional Record Document requirements in the PART I, Submittals paragraph under Close-out documentation.
   1. All Record Document information, except for full size floor plans and detail drawings, will be placed in the appropriate location in the Operations and Maintenance Manual described below.
   2. Full sized drawing sheets shall be supplied in triplicate and on electronic media.

1.4 OPERATIONS AND MAINTENANCE MANUALS (OWNER'S MANUAL)

A. Prepare Operations and Maintenance Manuals in accordance with Division 1 Section "Maintenance and Operation." In addition to the requirements specified in Division 1, provide additional information as detailed in each Section and include the following information for equipment items:

1. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions, regulation, control stopping, shutdown, and emergency instructions.
2. Equipment Maintenance Manuals indicating routine preventative maintenance and troubleshooting, disassembly, repair, and reassembly, aligning and adjusting instructions.

B. Schedule:
1. A review copy of the O&M Manual shall be submitted to the Owner within 2 weeks of substantial completion of the Project.
2. The corrected reproductions of the Manual shall be submitted within 2 weeks of the return of the review copy by the Owner.

C. Construction
1. Manuals shall be bound in hard cover, 3 ring binder(s) with clear plastic "pocket" covers to insert Project Information on the exterior of the Binder.
2. Maximum individual Binder spine size shall be 3"; utilize multiple binders as required.

D. Operations and Maintenance Manuals shall include the information listed below and be assembled as follows:
1. Binder shall be marked on the cover and spine with the following information
   a) Project Information
      1) Title of Project
      2) Name and address of Owner, Contractor, and Architect/Engineer
      3) Completion date of Project
   b) Contents of Binder
2. Section 1:
   a) Index
      1) Provide additional information if multiple binders are utilized.
3. Section 2 through x (Provide one (1) Tabbed Section for each Specification Section).
   a) Each Specification Section Tab shall include the following information:
      1) Sub Tab 1
         i) Specification Section Identification
      2) Sub Tab 2
         i) Warranty Information
         ii) Copy of "Substantial Completion" Document establishing warranty period.
         iii) Punch List Final Inspection certificate

3) Sub Tab 3
   i) A listing of all materials and equipment that was submitted for approval shall be bound into this manual separated into individual sections (by the Division 27 Section number) for each system.
   ii) A List of Drawings included as attachments to the O & M Manual.
      (A) Full Size drawings shall be submitted with the Manual and a index including sheet Title and Number be placed in this Tab
4) Sub Tab 4
   i) A copy of the Shop Drawings "Product Information Sheets" for each item required to perform Work as specified
      (A) Include a copy of the "stamped" and "approved" Product Information Sheets for each product utilized on the Project.
5) Sub Tab 5
   i) Manufacturer provided information (As Applicable)
      (A) Installation instructions published by the manufacturer
      (B) Operating instructions published by the manufacturer
      (C) Maintenance Manuals furnished with the equipment
         (1) Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and re-assembly; aligning and adjusting instructions.
         (2) Parts list pertaining to that equipment
      (D) Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
      (E) Manufacturer's printed operating procedures including start-up, break-in, normal operating instructions, regulation, control, stopping, shutdown, and emergency instructions.
      (F) Emergency operating instructions or a list of service organizations (including addresses and telephone numbers) capable of servicing various parts of the system.
6) Sub Tab 6
   i) Test reports (as applicable)
      (A) Infrastructure
         (1) Copper Backbone tests
         (2) Fiber Optic Backbone Tests
         (3) Horizontal cable tests
      (B) Systems
         (1) As required by the individual Specification Section
   ii) Summary test reports shall be placed in the O & M manual.

(A) Provide an electronic copy (CD-ROM) of all test results
(1) Provide "Reader" software on the disk.
(B) Provide a single copy of each detailed test.
(1) Tests shall be placed in (a) binder(s) in the same order as submitted on the summary reports.
(2) Submit with final "Approved" O & M Manual submission.

7) Sub Tab 7
i) Items listed in individual Division 27 sections and as previously described in the Record Documents paragraph. (Additional Tabs to separate Section(s) requirements.

E. Distribution:
1. Provide one review copy for Consultant approval prior to reproduction.
a) Consultant will review, correct or approve, and return.
2. Provide (5) copies of the complete (corrected) manual.
a) Include one printed copy of test results as detailed above.
b) Provide 5 copies of all attachments (drawings; electronic test reports, etc.).

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

A. Record Documents (A.K.A. AS-BUILTS)
1. Shall be prepared as outlined above.
2. Record actual site specific information
a) Make arrangements for providing two complete sets of communication prints which shall be used to provide record drawings which shall be separate, clean, prints reserved for the purpose of showing a complete picture of the work as actually installed (including routing of all conduit and cables).
b) Drawings shall serve as work progress report sheets and the Contractor shall make any notations, neat and legible thereon daily as work proceeds. The drawings shall be available for inspection at all times and shall be kept at the job at a location designated by the owner's representative.
c) Maintain the clean, undamaged set of prints of Contract Drawings as well as a set of submittal drawings and coordination drawings where applicable. Mark the sets to show the actual installation where the installation varies from the Contract Documents as originally shown. Record drawings shall include locations of underground and concealed items if placed other than shown on the Contract Documents. Do not permanently conceal any construction until this required information is recorded. Mark which drawing is most capable of showing conditions fully and accurately. Where shop drawings are used, record a cross-reference at the corresponding

location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

d) Record documents shall show changes in: size, type, capacity, etc., of material device or piece of equipment, location of device or piece of equipment; location of outlet or source of building service systems; routing of piping, conduit, or other building services. These drawings shall also record location of concealed equipment, communication service work, conduits and other piping/work by indication of measured dimensions to each line from readily identifiable and accessible walls or corners of building. Indicate all approved substitutions, contract modifications, and actual equipment and materials installed.

e) Record documents shall include a detail diagram of all mounting devices and method of rigging those devices to the structure. Record documents shall include plan view drawings indicating cable paths, cable types identified, device identification, riser diagrams, system block diagrams and rack layouts. System block diagrams shall indicate device selection and location in signal flow schematically. Contractor shall provide legend defining all devices and symbols used.

f) For communication work installed below slabs, pavements, grade, etc., these drawings shall also record location of nearby concealed water piping, sewers, wastes, vents, ducts, conduit and other piping, etc. by indication of measured dimensions to each line from readily identifiable and accessible walls or corners of building and from adjacent communication work. Show inverted elevation of underground communication work relative to work installed by other trades.

g) Upon substantial completion of the work make arrangements for obtaining a complete set of CAD computer files for the project. All information from the print record drawings shall be neatly drafted/digitized (using pre-established layering system) into the applicable CAD drawing. Neatly erase and redraft work as required to reflect the work as actually installed. Perform drafting in a manner in which all work shall be shown in its actual locations, existing as well as new, by erasing inaccurate locations and redrawing proper routing/locations. This applies for all concealed work as well as work visible. All work shall be performed using AutoCAD Release 2000 or more recent release of AutoCAD.

h) Affix near the title block on each drawing of the set of record drawing prints the Contractor’s Company Names, signature of Contractors' Representative and current date. Deliver one set of prints to the Designer. Deliver the second set of prints, the original reproducibles, the CAD computer files and the marked-up field prints to the architect.

i) All prints shall be signed and dated by the General Contractor, This Contractor and applicable Subcontractor.

j) In addition to the above, provide "as-built" record documentation for shop drawings (and coordination drawings where applicable).

END OF SECTION 27 01 00.00

Revised 11/20/2019

BASIC MATERIALS AND METHODS FOR COMMUNICATIONS

PART 1 MATERIALS AND METHODS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. Basic materials, methods and installation guidelines applicable to the installation of all communication systems.
      a) This Section is a "Common Work Results" Section that includes information that is applicable and "Related" to all Division 27 Sections.

B. Related Sections
   1. All Division 27 Sections.

C. Related Drawings
   1. All Technology (T-Series) Drawings

1.3 QUALITY ASSURANCE

A. Welding
   1. Welding shall be performed by persons licensed by the authority having jurisdiction where the work is performed. This shall apply to all work which is routinely regulated by said authority.

B. High Voltage Wiring
   1. High voltage wiring and connections shall be performed by persons licensed by the authority having jurisdiction where the work is performed. This shall apply to all work which is routinely regulated by same authority.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 RELATED OPERATIONS

A. Welding
   1. Onsite welding, where it is necessary, shall not be performed without the express written consent of the owner's representative. All project specifications governing welding shall apply, regardless of whether said specifications are referenced within the Division 27 specifications.

B. High Voltage Wiring
   1. Review all high voltage provisions for This Contractor's work with the Division 16 electrical contractor. Coordinate specific device termination, loading and circuiting requirements with the electrical contractor.

3.2 INSTALLATION OF COMMUNICATIONS SYSTEMS

A. General
   1. All work installed in finished areas shall be concealed. All work installed in unfinished areas may be exposed at the discretion of the Owner's representative.
   2. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, Any exceptions to be approved by Owner.
   3. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.
   4. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
   5. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
   6. Verify all dimensions by field measurements. Take measurements and be responsible for exact size and locations of all openings required for the installation of work. Figured dimensions are reasonably accurate and should govern in setting out work. Where detailed method of installation is not indicated or where variations exist between described work and approved practice, direction of the owner's representative on job shall be followed.
   7. The symbols used to indicate the purpose of which the various outlets are intended are identified in the Legend.
   8. If during construction it becomes apparent that certain minor changes in layout will affect a neater job or better arrangement, such alterations shall be made as part of the contract. Owner's review shall be obtained before making such changes.
   9. Workmanship throughout shall conform to the standards of best practice. Marks, dents or finish scratches will not be permitted on any exposed materials, fixtures or fittings. Inside of panels and equipment boxes shall be left clean.

10. Use caution not to exceed the allowed bending radius for respective cables and not to compromise the integrity of the cables during installation by pulling cable management devices too tightly, damaging cables, etc. Raceway/Cabling bending radii shall be minimum as directed by cable manufacturer. Use pulling compound or lubricant, where necessary; compound must not deteriorate conductor or insulation.

B. Cable
   1. General
      a) Provide color-coded jackets to identify runs of different systems.
         1) See related specifications and drawings for applicable color coding.
      b) Neatly route cables parallel, perpendicular and plumb to building architectural lines.
      c) **Neatly comb out multiple cable bundled runs to remove tangling and crossing of cables within the bundles. Neatly dress all cable work and provide vertical and horizontal cable management** (or other approved method) for properly dressing all work at racks, control panels, backboards etc. See detail(s) if applicable.
         1) To avoid Alien Crosstalk, do not cinch UTP cables into tight bundles.
      d) Plenum-rated hook and loop one inch wide tape shall be used wherever wire ties are permitted and wherever plenum rated cable is used.
      e) Plenum-rated hook and loop one inch wide tape shall never be used in a manner that causes deformation of the cable jacket, damage to the cable, or has any adverse affect on the usability, specifications or longevity of the cable(s) on which it is applied.
      f) Plenum-rated hook and loop one inch wide tape (Velcro) type wire ties shall be used in plenum spaces; in equipment racks; in rack cabinets, and; in related equipment housing enclosures.
   2. Support
      a) All cables shall be supported/anchored every 5 feet (or less) and within 12" of device boxes, outlets, racks/cabinets and cable tray.
      b) Use J-Hook type cable supports for all cables run outside of conduit or cable tray. Bridle rings shall not be used for Communications Technology cables.
      c) Use separate J-Hook cable support systems for cables belonging to different systems and for cables carrying different operating levels. See Cable Separation guidelines in this section.
      d) Loosely secure cables at each J-Hook.
      e) Cables shall not be directly or indirectly supported by a suspended ceiling or any other surface, support, material or structure not permissible for this use by all applicable codes and standards.

f) Cable trays or messenger strand positioning
   1) Used to route cables in hallways
   2) Each must have a minimum twelve inches (12") vertical clear space above the top of the cable tray or messenger strand, and a minimum six inches (6") clear space below and on each side of the cable tray or messenger strand.

3. Cable Separation
   a) Cables carrying signals of different nominal operating level shall be kept separated to reduce the risk of undesirable cross-talk interference between cables.
      1) As a general rule, for each 25dB of nominal level voltage difference between cables, Contractor shall provide an additional 6 inches of physical separation between the cables. For example: cables with a 25dB voltage difference shall be separated by at least 18 inches. As the difference increases the distance shall increase proportionally.
      2) This guideline shall be used to govern the separation of low voltage Communications Technology cabling from AC power circuits as well. For example: A Microphone line running parallel to a 480v power line shall be separated by nearly 27-30 inches.
      3) Provide greater separation than this guideline where the contractor believes and/or determines it is necessary to prevent or remedy interference between cables.
   b) Keep length of parallel runs to a minimum. Cross cables of different nominal levels at 90 degrees.
   c) Provide additional separation as necessary to prevent and remedy any crosstalk which:
      1) Adversely affects the performance and usablity of the system, or;
      2) Exceeds specific crosstalk perfomance specified in individual specifications.
   d) Contractor shall take all precautions necessary to keep low-voltage cable away from sources of EMI and RF interference. Where close proximity is absolutely necessary to satisfactory appearance, performance or installation of the Work, provide all necessary shielding necessary to ensure that ingress interference is minimal and has no negative impact of the Work.
4. Cable Termination
   a) The cables terminating at a device outlet shall be left not less than 10 inches to facilitate installation and servicing of devices. Longer working lengths shall be provided as appropriate to the application.
   b) All termination types shall correctly match the cable and device termination point. Connectors of the appropriate type, size, color and rating shall be used to match with the mating equipment

c) Tools as recommended by each specific connector manufacturer shall be used in attachment of all connectors.

d) Spade connectors.
   1) Spade type connectors shall be used on cable ends where screw-type terminal connectors are used.
      i) All spade connectors shall be insulated. Provide heat shrink type insulation where solder-type or non-insulated spade connectors are used.
   2) Spade connectors used shall be rated by the manufacturer for the gauge, insulation, type and stranding of the cable to which it is applied. Spade connectors shall be sized to exactly match the stud size and spacing of mating termination connector.
   3) Tools as recommended by the specific connector manufacturer shall be used in attachment of the connector to the cable.
   4) When spade connectors are the required to be used for audio circuits operating at <= +8dBv nominal, solder type spade connectors only shall be permitted.
   5) No more then two spade connectors shall be permitted under a single terminal. Fewer should be used when recommended by the specific manufacturer's equipment or connector.

e) Wire Nuts
   1) Wire nuts shall not be used in any audio circuit, except when necessary in the following:
      i) 25 Voltage Constant-Voltage loudspeaker circuits.
      ii) 70 Voltage Constant-Voltage loudspeaker circuits.
   2) Wire nuts shall not be used in any data or voice communications or remote control circuit.
   3) Wire nuts shall not be used in any circuit which radiates RF energy.
   4) Contractor must advise and gain prior approval of the Owner for any circuit which the Contractor desires to use wirenuts as the means of termination.

f) Drain Wires, Non-insulated Ground Wires and Shields
   1) Drain or non-insulated ground conductors shall be insulated with appropriately sized heat-shrinkable insulated sleeving immediately upon exit from the jacket of the cable. Contractor shall use GREEN colored sleeving unless otherwise necessary to resolve specific color coding conflicts on a given cable. This methodology shall apply to ALL methods of termination, including inline connectors, device plates, direct equipment terminations etc… Sleeving shall be applied to twisted and braided shields once the internal conductors have been combed out or otherwise removed from the center of the shield.

2) Wherever a cable contains a non-insulated conductor within a jacketed cable, the conductors, as they exit the manufacturer's jacket, shall have a piece of heat shrinkable sleeving applied equally over the jacket and the exposed insulated conductors. The length of this sleeving shall be 1" for all cable diameters of .250" or less. For cables diameters larger then .250" the length of the sleeving shall be approximately equal to 4 times the diameter of the cable jacket. Note: This added sleeving is recommended but not mandatory when cable termination occurs fully within the confines of a fully insulated and strain relieved connector. Black shall be used unless otherwise necessary for specific cosmetic or cable identification purposes.
3) A heat-gun of the appropriate temperature, size, type and rating for shrinking the tubing shall be used as recommended by the manufacturer of the sleeving used. Open flame (i.e. matches, cigarette lighters, torches) and direct metal conduction (i.e. soldering iron) methods to shrink the sleeving shall not be permitted. Sleeving which is burnt or otherwise marred shall be removed and replaced.
4) There shall not be any non-insulated exposed conductors within a device backbox, junction box, or equipment rack/cabinet.

g) Unused Conductors
1) Unused conductors shall not be "clipped" or removed from any jacketed cable. Conductors which are not required or used at the end of a jacketed cable shall be kept intact. Conductors shall be fully insulated from one and other to prevent shorts which could occur at either end of the cable. Conductor ends shall also be insulated to prevent shorts to other conductive materials which could come in contact with the conductor.
2) Unused conductors shall be kept the same length as the longest conductor of the cable being used.

h) Cable and Conductor Nicks
1) Attention shall be paid to the proper preparation of all cables and all conductors of these cables. There shall not be nicks to cable jackets, conductor insulation, or the conductors themselves.
2) Special attention should be paid to nicked conductors. Should a conductor be nicked during preparation or termination the cable shall be reworked/replaced to remove the nick.

i) Cut, Disconnected, or Not Terminated Cables
1) Any voice, data, or coaxial cable that is cut, disconnected, or not terminated at both ends shall be completely removed end to end. Any labels at either end shall be erased. Record drawings shall reflect the removal of these cables.

END OF SECTION 27 05 01.00

Revised 11/20/2019

PATHWAYS FOR COMMUNICATIONS SYSTEMS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:

1. This Section includes requirements and minimum standards for:
   a) Raceways
   b) Fittings
   c) Boxes
   d) Penetrations
   e) Pathway accessories
2. This Section is a “Common Work Results” Section that includes information that is applicable and “Related” to all Division 27 Sections.
3. This Section requires the addition of basic items, not specified elsewhere, to the installation of pathways.
   a) Add the following to the pathways:
      1) Provide a pull rope in each installed pathway and leave a pull rope in the pathway after the cabling is installed.
      2) Provide proper identification, labeling, and documentation of key pathway locations and components.
      3) All pathways designed for fiber optic cables will require an innerduct for the installation of the fiber optic cable unless interlocking armored cable construction is utilized.
      4) Provide cable spillways where cabling will drop out of sleeve(s), unsupported for more than six inches:

B. Related Sections

1. All Division 27 Sections

C. Related Drawings

1. Technology (T-Series) Drawings

1.3 REFERENCES

A. ANSI/TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
B. ANSI/TIA/EIA-606-A – The Administrative Standard for the Telecommunications Infrastructure of Commercial Building.
C. "TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL" published by the Building Industry Consulting Services International (BISCI).

1.4 GENERAL INFORMATION

A. NFPA Compliance:
   1. Comply with NFPA 70 "National Electrical Code" for components and installation.
B. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access.
C. UL Compliance:
   1. Cable tray shall be UL certified.
   2. Sleeves shall be UL listed assemblies.
D. All Work shall fully comply with these Specifications and related Drawings and all manufacturers' recommended installation practices.

1.5 SYSTEM DESCRIPTION / DESCRIPTION OF WORK

A. The work covered by this Specification Section includes any and all requirements for this type work required for proper installation of work specified in each related Division 27 Specification Section and/or as shown on the Drawings.
   1. This Specification Section is a Materials and Methods Section for Division 27. All requirements herein are required by each related Section and will be enforced for each related Section.
   2. Pathways for Communications are to be provided to create a re-usable pathway for Communications cables.

1.6 SUBMITTALS

A. General
   1. Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.
   2. Samples shall be submitted with or immediately following submission of Product Data submittals.

B. Items to be submitted for approval prior to commencement of work:
   1. Product Data
      a) Manufacture datasheets for all items
         1) Data sheets shall include
            i) Manufacturer name
            ii) Manufacturer model number (as it appears on manufacturer's product data sheet)
            iii) Manufacturer product description
            iv) Paragraph number of this section where the product is specified.
            v) Picture or Drawing of item

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

A. General
   1. Part II is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.
      a) This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the "Products" section that are not required under the Scope of this Contract.

2.2 RACEWAYS

A. Conduits
   1. Rigid steel conduit:
      a) Threaded rigid steel conduit shall be manufactured from mild steel, zinc galvanized both inside and outside including threads. It shall be constructed in accordance with ANSI C80.1, Federal Specification WW-C-581; UL listed.
   2. Intermediate metallic conduit:
      a) Threaded intermediate metallic conduit shall be manufactured from mild steel, zinc galvanized both inside and outside including threads. It shall be constructed in accordance with ANSI C80.6, Federal Specification WW-C-581; UL listed.
   3. Electric metallic tubing:
      a) Electric metallic tubing shall be manufactured from mild steel, zinc galvanized both inside and outside. It shall be constructed in accordance with ANSI C80.2, Federal Specification WW-C-563; UL listed.

4. Flexible metallic conduit:
    a) Flexible metallic conduit with neoprene jacket shall be spirally wound steel, strip zinc galvanized both inside and outside, integral ground conductor.
        1) Unless otherwise indicated, flexible metallic conduit provided for telecommunications cabling can only be provided as a pathway from the telecommunications outlet box to the ceiling space above and cannot exceed 6 meters.
5. Non-metallic raceways
    a) Polyvinlychloride (PVC):
        1) PVC conduit shall be virgin C300 type, Schedule 40 or 80 (90° C). It shall be constructed in accordance with NEMA TC2 and Federal Specifications W-C-1094A.

B. Surface raceways:
1. Single compartment raceway:
    a) Single compartment electrical ivory raceway as indicated, surface mounted base with cover.
        1) Provide appropriate elbows (Panduit RAFC10IW-X), tees (Panduit TFC10IW-X), entrance end fitting (Panduit DCEFXIW-X), etc. to follow wall layout.
        2) Standard of quality shall be Panduit Panway LDP-10IW8-A.
        3) Additional approved manufacturers: Wiremold, Hubbell
2. Large Single compartment raceway:
    a) Single compartment electrical ivory raceway as indicated, two piece surface mounted with snap on cover.
        1) Provide appropriate elbows, tees, entrance end fitting, etc. to follow wall layout. Provide wire T45WR-X retainers at a minimum of every three feet and as necessary to contain cabling.
        2) Standard of quality shall be Panduit Panway T-45.
            i) Additional approved manufacturers: Wiremold, Hubbell
3. Two compartment raceway:
    a) Dual channel electrical ivory raceway as shown on the Drawings, two-piece surface mounted with snap on cover, compartment for power, and compartment for data.
        1) Provide appropriate elbows, tees, entrance end fittings, etc. as recommended by the manufacturer.
        2) Standard of quality shall be Panduit Panway Twin-70.
            i) Additional approved manufacturers: Wiremold, Hubbell

C. Telecommunications/power poles:
1. Construction:
    a) Two compartment.
    b) 10 foot – 5 inch height and 2 ½ inches x 2 5/16 inch overall width.
    c) Removable covers.

2. Provide mounting hardware, entrance end fitting, and ceiling trim plate.
3. Standard of quality shall be Panduit Pan-pole.
    a) Additional approved manufacturer: Wiremold, Hubbell

D. Cable tray:
1. Wall Mounted
    a) Provide cable tray sized and located as indicated on the Drawings.
    b) Cable tray shall comply with NEMA 8B, 12B, or 12C. Cable tray and all fittings and accessories shall effect a complete structural system in the form of a rigid mechanical tray of compatible material and design, functional to support all cabling.
    c) Provide aluminum, rectangular tube, center spine with rungs perpendicular to the spine and spaced 6 inches on center.
    d) Prefabricated structure consisting of a longitudinal rail with transversely connected members (rungs) that project from one side; single or double tiered; aluminum alloy.
    e) Provide gray-colored manufacturer's rung caps on all rungs.
    f) Sections to be joined by bolted splice connectors.
    g) 4 inches overall depth per tier, 6 inches rung spacing.
    h) Rung ends shall be factory bent upward to a height as indicated on the Drawings.
    i) The rungs shall be positioned at the side of the spine at the top such that the spine is not part of the cable laying area (for example see Mono-Systems "top rung" cable tray).
    j) Provide all manufacturer recommended fittings and accessories for a complete and functional system as indicated.
        1) Accessories: Provide crosses, tees, angles, wyes, drops, rises, etc., and other accessories required for the installation specified.
    k) Standard of quality shall be Mono Systems 6114-0323 and 9114-0323.
        1) Approved manufacturers include: Allied Support Systems, B-Line.
2. Center Hung
    a) Provide cable tray sized and located as indicated on the Drawings.
    b) Cable tray shall comply with NEMA 8B, 12B, or 12C. Cable tray and all fittings and accessories shall effect a complete structural system in the form of a rigid mechanical tray of compatible material and design, functional to support all cabling.
    c) Provide aluminum, rectangular tube, center spine with rungs perpendicular to the spine and spaced 6 inches on center.
    d) Prefabricated structure consisting of a longitudinal rail with transversely connected members (rungs) that project from both sides; aluminum alloy.
    e) Provide gray-colored manufacturer's rung caps on all rungs.
    f) Sections to be joined by bolted splice connectors.

g) 4 inches overall depth per tier, 6 inches rung spacing.
h) Rung ends shall be factory bent upward to a height as indicated on the Drawings.
i) The rungs shall be positioned at the side of the spine at the top such that the spine is not part of the cable laying area (for example see Mono-Systems "top rung" cable tray).
j) Provide all manufacturer recommended fittings and accessories for a complete and functional system as indicated.
   1) Accessories: Provide crosses, tees, angles, wyes, drops, rises, etc., and other accessories required for the installation specified.
   2) Provide waterfall fittings in every location that cable is designed to exit the tray downward at the end of a run or between the rungs.
   3) Support with threaded rod and U-channel supports systems (See Accessories, Supporting Devices – Field Fabricated)
k) Standard of quality shall be Mono Systems .
   1) Additional approved manufacturers include: Allied Support Systems, B-Line.

E. Telecommunications cabling support: Where necessary, provide additional cable support to create a re-usable pathway for Communications cables:
   1. General
      a) Primary pathways are those supporting the cabling infrastructure from the Equipment Rooms/Telecommunications Rooms through the corridors and chases to the secondary pathways.
      b) Secondary pathways are those supporting the cabling infrastructure from the primary pathway to telecommunications outlets.
      c) Cable supporting devices manufactured with small round surfaces (i.e. bridal rings) are not acceptable.
   2. Primary pathways
      a) Messenger Strand
         1) Anchors shall be securely mounted to building structure at each end.
         2) Tensioners shall be installed to connect strand.
         3) Additional supports shall be installed with threaded rod from the deck above to support the strand approximately 6-8" above suspended ceiling in all locations.
            i) Support with threaded rod and U-channel supports systems (See Accessories, Supporting Devices – Field Fabricated)
            ii) Properly sized.
               (A) Multiples of strands (100 horizontal cables each) appropriate to handle the required cable quantities plus 25% spare capacity.
               (B) Separate strand for Backbone cables.
            iii) Provide minimum ¼" steel strand with applicable hardware.
      b) Open top cable supports

1) Plenum rated
2) Complies with UL, cUL, NEC, and ANSI/TIA/EIA requirements for structured cabling systems.
3) Shall be mounted to building structure or suspended by threaded rod from the deck above approximately 6-12" above suspended ceiling.
    i) Support with threaded rod and U-channel supports systems (See Accessories, Supporting Devices – Field Fabricated)
    ii) Properly sized.
        (A) Multiples of J-Hooks (80 cables each) appropriate to handle the required cable quantities plus 25% spare capacity.
        (B) Multiples of J-Hooks (300 cables each) appropriate to handle the required cable quantities plus 25% spare capacity.
    iii) Provide Erico CAT32/CAT64 or approved equal for all primary pathway cable support.
    iv) Additional approved manufacturers: B-Line, Panduit

3. Secondary pathways (those extending from the primary pathways to the space above the telecommunications outlets).
    a) J-hooks with galvanized finish to provide smooth surface and corrosion resistance.
    b) Complies with UL, cUL, NEC, and ANSI/TIA/EIA requirements for structured cabling systems.
    c) Accommodates up to 16 horizontal UTP cables.
    d) Shall be mounted to building structure or suspended by threaded rod from the deck above approximately 6-12" above suspended ceiling.
        1) Support with threaded rod and U-channel supports systems (See Accessories, Supporting Devices – Field Fabricated)
    e) Standard of Quality shall be Erico CAT12xx/CAT21xx
        1) Additional approved manufacturer(s): B-Line, Panduit
4. Small Secondary pathways
    a) Mounting for up to ten 4 pair UTP cables may be supported from ceiling grid support wires (at least every 5').
    b) Standard of quality shall be Erico CAT12TS
        1) Additional approved manufacturer(s): B-line, Panduit

2.3 FITTINGS

A. Rigid steel or intermediate metallic conduit:
    1. Fittings shall be threaded zinc galvanized steel.
    2. At least one bushing shall be grounding type
        a) Equipped with a ground lug
        b) Provide on each conduit or sleeve where surface extends below ceiling line.

B. Electric metallic tubing:
   1. Fittings shall be compression type.
   2. At least one bushing shall be grounding type
      a) Equipped with a ground lug
      b) Provide on each conduit or sleeve where surface extends below ceiling line.

C. Flexible metallic conduit:
   1. Fittings shall be suitable for the specific application.
   2. Use oil-tight fittings with neoprene jacketed flexible metallic conduit.

D. Non-metallic conduit:
   1. Fittings shall be of the same type and manufacturer as the raceway, connected in accordance with manufacturer's written instructions.

E. Expansion:
   1. Expansion fittings shall be of a type suitable for the particular condition and shall be complete with bonding jumper.

2.4 BOXES

A. Box Eliminator devices
   1. Standard outlet size brackets that securely clamp to drywall.
   2. Available in single and dual gang sizes.
   3. Standard of quality shall be Caddy by Erico MP-1
      a) Additional approved manufacturer(s):

B. Floor Boxes
   1. Shall be utilize only with prior Owner approval
   2. FSR type boxes; see Division 26 specifications for exact sizing.
   3. Separate Telecommunications and Electrical compartments.
   4. A minimum of two 1" conduits or a 1 ¼" conduit for Communications cables.

C. Outlet boxes:
   1. General:
      a) Stamped steel, code gauge, galvanized, minimum 2 ½ inches deep.
      b) Provide single or double gang outlet boxes as indicated in details on the Drawings.
   2. In masonry or tile walls:
      a) Rectangular boxes, 4" square, with square corners minimum 2 ½ inches deep where the box is at the end of the run.
         1) Provide 1" deep single or 2 device trim ring.
      b) Rectangular boxes, 4 11/16" square, with square corners minimum 2 ½ inches deep where the box is in a continuing run.
         1) Provide 1" deep single or 2 device trim ring.

3. In gypsum board walls
    a) Single and dual gang outlet boxes with a depth of 3 to 3.5".
4. Surface mounted and exterior use:
    a) Single or dual gang Cast aluminum boxes with threaded hubs
5. No through-wall boxes or utility boxes will be accepted.
6. Where surface raceway is indicated, provide outlet boxes designed for use with the raceway by the same manufacturer as the surface raceway.

D. Junction boxes:
1. Covers shall be screw attached (unless otherwise noted on the drawing) and of same type of material as the box. All covers shall be easily accessed.
2. Boxes in exterior or moist locations shall meet NEMA 3R (at minimum)
    a) The box must meet the NEMA requirements for the atmospheric condition in which the box is installed.
3. Surface raceway boxes
    a) Where surface raceway is indicated, provide junction boxes by the same manufacturer as the surface raceway.

E. Pull boxes:
1. Required after every 100' or after 180 degrees of bends in a conduit run
2. Shall be sized as follows:
    a) One 4" conduit straight through pull:
        i) 15" wide, 60" long, and 8" deep; minimum.
        ii) Add 8" to the width for each additional conduit.
        iii) Information about other trade sizes; reference EIA/TIA 569 standard.

F. Splice boxes:
1. Required after every 100' or after 180 degrees of bends in a conduit run
2. Used to hold splice hardware.
3. Shall be sized as follows:
    a) One 4" conduit straight through pull:
        i) 42" wide, 66" long, and 11" deep; minimum.
        ii) Add 7" to the width for each additional conduit.
        iii) Information about other trade sizes; reference EIA/TIA 569 standard.

G. Poke-thru systems:
1. Assembly consisting of disposable plate, barriered raceway, conduit adaptor, housing, base, barrier, and faceplate.
    a) Provide Wiremold RC900-FF3 series multi-service poke-thru with 341-H/B assembly and FP2R faceplates as indicated.
        1) Additional approved manufacturers: Hubbell, Walker

2.5 ACCESSORIES

A. Pull wires:
   1. Pull wires shall be nylon type as manufactured by Arnco or approved equal.
   2. Provide in all empty conduits, sleeves, raceways, and all cabling pathways for future use.
      a) Additional approved manufacturers: Greenlee, Condux

B. Fiber optic innderduct:
   1. NEMA TC 5, UL listed, corrugated, specifically designed for optical fiber cable pathways.
      a) Fiber optic innerduct shall be orange in color
      b) Innerduct shall be 1-inch minimum inside diameter, and a minimum pulling strength of 600 pounds.
      c) Each innerduct shall include a factory installed pull rope
      d) Each duct shall be suited for the environment in which it is installed.
      e) Standard of Quality shall be Carlon DF4X1C-xxxx for installation in Riser rated applications; and, Carlon CF4X1C-xxxx for installation in Plenum environments.
         1) Additional approved Manufacturers: Arnco, Endot, Opti-Com, Pyramid

C. Cable spillways
   1. Provide Bejed BJ-2049B-002 Spillway on four-inch sleeves; provide Bejed BJ-2049A-001 Cable Spillway on two-inch sleeves.
      a) Additional approved manufacturers: B-Line, Panduit

D. Labels
   1. Standard of quality shall be Brady
      a) Additional approved manufacturers: Panduit, Hellerman-Tyton

E. Penetrations through floors and walls
   1. Sleeves through floors and walls:
      a) All penetrations through floors or walls to allow Division 27 cable or pathway to pass through will require a UL listed device for the purpose of penetrating the construction.
      b) Penetrations through walls of spaces utilizing a chemical or pressure system for fire suppression must utilize Wiremold FS series penetration unless an alternate assembly is pre-approved by the Owner.

c) Refer the Penetration Sectional View Drawings for UL listed assemblies.
   1) Concrete, block, brick, and gypsum drywall construction providing a fire rating of greater than one hour for walls and floors will require a UL rated sleeve assembly installed to manufacturer's requirements allowing the penetration(s) to not degrade the designed fire rating of the wall or floor.
      i) Standard of quality shall be as manufactured by Unique Fire Stop Products (USFP). Utilize USFP's Threaded Penetrator system for all fire-rated penetrations.
      ii) Additional approved manufacturers : Specified Technologies E-Z Path, Wiremold FS Series
   2) All other penetrations and gypsum drywall constructed walls providing a fire rating of one hour or less will require a UL rated sleeve assembly installed to manufacturer's requirements allowing the penetration(s) to not degrade the designed fire rating of the wall or floor.
      i) Standard of quality shall be as manufactured by Unique Fire Stop Products (USFP). Utilize USFP's Smooth Penetrator system for all fire-rated penetrations.
      ii) Additional approved manufacturers : Specified Technologies E-Z Path, Wiremold FS Series
   3) All penetrations found to be improperly sleeved after the installation of cabling will be sleeved and firestopped to restore the proper aesthetics and required fire rating to the obstruction.
      i) Standard of quality shall be as manufactured by Unique Fire Stop Products (USFP). Utilize USFP's split-sleeve system for all fire rated penetrations.

d) Penetrations into fire rated walls with gypsum board construction.
   1) All penetrations required in gypsum board walls for installation of horizontal cabling, where conduit is not stubbed into the ceiling cavity for this purpose, will require a sleeved penetration through the drywall membrane or the wall cap.
      i) Each penetration will require a UL listed sleeve assembly installed by an installer trained on proper installation of the sleeving device.
      ii) Standard of quality shall be as manufactured by Unique Fire Stop Products (USFP). Utilize USFP's Membrane Penetrator or Cap Penetrator system for all fire rated penetrations.
      iii) Additional approved manufacturers : Specified Technologies E-Z Path, Wiremold FS Series
   2) Standard of quality shall be Unique Fire Stop Products.
      i) Additional approved manufacturers : Specified Technologies E-Z Path, Wiremold FS Series

F. Supporting devices – Field Fabricated:
   1. General
      a) Shop or field-fabricated supports or manufactured supports assembled from U-channel components.
      b) Steel brackets: Fabricated of angles, channels, and other standard structural shapes.Connect with welds and machine bolts to form rigid supports.
      c) All steel components utilized to fabricate supports shall be of U.S. manufacture.
   2. Coatings:
      a) Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.
      b) Where possible, supports shall have a finish similar to the device it is supporting.
         1) Where installed below the finished ceiling line, the support shall be painted to match the finish of the device it is supporting.
   3. Material Types
      a) Concrete and masonry anchors:
         1) Shall be a guaranteed anchoring system with field training available.
            i) Standard of quality will be as manufactured by Hilti or approved equal.
            ii) All onsite personnel performing this work will be required to be manufacturer trained on the anchoring system being utilized, and upon request, to show proof of manufacturer's training certification.
      b) Raceway supports:
         1) Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.
      c) Fasteners:
         1) Types, materials, and construction features as follows:
            i) Expansion anchors:
               (A) Carbon steel wedge or sleeve type
            ii) Toggle bolts:
               (A) All steel springhead type
            iii) Powder-driven threaded studs:
               (A) Heat-treated steel, designed specifically for the intended service

d) Conduit sealing bushings:
   1) Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

e) Cable supports for vertical conduit:
   1) Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

f) Threaded Rod Stock (All-Thread Rod)
   1) Available in ¼", 3/8", ½" , and 5/8" sizes.
      i) Utilize ½" for supporting of 12" ladder racks and cable trays.
      ii) Utilize 5/8" for supporting of 24" ladder racks and cable trays.
   2) Rod lengths over 6' will require a "Rod Stiffener" installation for ½" and 5/8" rods.
      i) A section of U-Channel stock is placed around the rod and stiffener clamp assemblies used to clamp to rod
         (A) Place clamps a minimum of 6" from the top and bottom of the rod and every 18" in between.
         (B) Standard of quality shall be B-Line SC228
            (1) Additional approved manufacturer(s): Unistrut Diversified Products, GS Metals Corp., Haydon Corp., Kin-Line Inc.

g) U-channel systems:
   1) 16-gauge steel channels, with 9/16 inch diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

4. Slotted metal angle and U-channel systems:
   a) Standard of quality shall be Unistrut Diversified Products
      1) Additional approved manufacturers: Allied Tube & Conduit, American Electric, B-Line Systems, Inc., Cinch Clamp Co., Inc., GS Metals Corp., Haydon Corp., Kin-Line Inc.

PART 3 EXECUTION

3.1 GENERAL

A. Minimum raceway size shall be as necessary to comply with fill ratio of referenced standards, but in no case less than one and one quarter inch (1 1/4 inch).
B. Provide specified pull wires in all cabling pathways.
C. Ground and bond all systems in accordance with the NEC and ANSI/TIA/EIA 607.

D. All installation material and practices shall fully comply with NFPA 70 "National Electrical Code" and ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and Spaces.
E. Coordinate work with the building structural systems and electrical installation.
F. All work shall fully comply with these Specifications and related Drawings and all manufacturers' recommended installation practices.

3.2 PATHWAY INSTALLATION

A. Raceways
1. Conduit Usage:
a) Rigid Galvanized Steel (GRC):
1) All exposed conduit installed above grade outside the building envelope.
2) All conduits installed in moist locations.
b) Electric Metallic Tubing (EMT):
1) All conduits within the building envelope.
c) Polyvinylchloride (PVC):
1) Underground which may continue from underground through floor slab to Equipment Room/Telecommunications Room.
d) Flexible Metal Conduit (FMC):
1) Unless otherwise indicated, FMC can only be provided for secondary pathways from the ceiling space to the telecommunications outlet box.
2) Maximum length shall not exceed 6 meters.
2. Conduit installation:
a) Provide all conduit terminations with locknuts and bushings. Provide conduits 1 ½ inches and larger with insulating bushings and locknuts inside and outside the enclosure.
1) At least one bushing per conduit shall be grounding type
i) Equipped with a ground lug
ii) Provide on each conduit or sleeve where surface extends below ceiling line and install Bonding Conductor to TMGB.
b) Support conduits by pipe straps or trapeze hangers. Space supports not more than 8 feet on center. Secure supports by means of toggle bolts, inserts or expansion bolts.
c) Space wall brackets supporting conduits not more than 4 feet 6 inches on center. Secure supports by means of toggle bolts, inserts or expansion bolts.
d) Support conduits directly from structural systems not from ceiling suspensions systems.
1) Provide additional support at junction or pull boxes.
e) Wherever possible, conceal raceways under floors, in walls, above ceilings or in furred spaces in finishes areas.

f) Support single conduits 1 ½ inches and larger by means of rod and cast ring hangers. Support multiple runs in similar manner or use common trapeze hanger.
   1) Trapeze hanger:
      i) Unistrut P2000 or P4000, or equal by Allied Support systems or Superstrut, as required for span and loading.
      ii) Provide end caps on hangers.
      iii) Fasten conduits by means of heavy galvanized straps.

g) Provide two hole sheet metal pipe straps for all surface mounted conduit supports on walls up to a height of 8 feet above the finished floor. Pinch type hangers similar to minerallac type may only be used at heights greater than 8 feet.

h) Protect conduits during construction with temporary plugs or caps. Securely cap all conduit until wire or cable is installed.

i) Minimum conduit size is 1 inch.

j) Do not install conduit in concrete slab.

k) Provide expansion fittings where raceway crosses the building expansion joints. (O.X. Type AX, EX, EXDS, TX, EXE, or approved equal).

l) Route and maintain conduits as shown on the Drawings.
   1) If no specific routing information appears on the Drawings, the routing shown shall be considered diagrammatic.
      i) In such a case, the Contractor shall coordinate his Work with the different trades so that interferences between conduit, cable tray, piping, equipment, architectural, and structural work shall be avoided.
         (A) Should an interference arise, the Contractor shall inform the Consultant before proceeding with the Work.
         (B) Should the Contractor fail to contact the Consultant and interferences develop, the Owner's Representative will decide which equipment, piping, etc. must be replaced, regardless of which was installed first. The relocation shall be performed at no expense to the Owner.

m) There shall not be more than the equivalent of 180 degrees of bends in any single run of conduit between adequately sized pull.

n) Conduit bends
   1) Bends shall be made so that the conduit will not be flattened or kinked and the internal diameter of the conduit will not be reduced.
   2) The radius of the curve of the inner edge of any bend shall not be less than as indicated by the National Electrical Code and ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and Spaces.

3) In no case shall any conduit be bent or any fabricated elbow be applied to less than the allowable bending radius as specified by the cable manufacturer of the installed conductor.
4) When necessary to make field bends, use tools designed for conduit bending.
   i) Heating of metallic conduit to facilitate bending is not permitted.

o) A conduit run shall not be longer than 100' between pull boxes for conduit runs inside a building.
p) The Contractor shall not cut, burn, or drill any structural member to mount electrical equipment or to facilitate tray or conduit installations without having previously received approval, in writing, from the Architect/Engineer/Consultant.
q) Mount all conduits a minimum of 7 inches above any accessible type ceiling.
r) Maintain conduit runs at least 6 inches from insulated pipes, steam lines or any other hot pipes they pass. Where the lines are not insulated, the clearances shall be increased until the temperature of the conduit, with no live conductors enclosed, does not rise above the ambient temperature of the installation area.
s) Conceal all raceways except where otherwise indicated.
   1) Provide flashing and counter-flashing or pitch pockets for waterproofing of all raceways, outlets, fittings, etc. that penetrate the roof.
   2) Route all raceways parallel or perpendicular to the building lines with symmetrical bends.
   3) Provide sleeves in forms for new concrete walls, floor slabs, and partitions for passage of raceways.
      i) Seal in an approved manner all raceway openings and sleeves through fire rated walls, floors, and ceilings after raceway installation.
t) Waterproof all sleeved raceways where required.

B. Surface Raceway
   1. Surface raceway installation
      a) Provide surface raceways as indicated.
      b) Coordinate installation with casework before installation. Field verify lengths to be installed before ordering equipment.
      c) Install plumb and level.
      d) Anchor all raceways to walls with the anchors designed for that particular wall construction. Secure raceway at a minimum of every 2 feet and not less than 6 inches from raceway ends.
      e) Install raceway per the manufacturer's written recommendation, including necessary entrance, end and bend fittings.
      f) Provide all of the manufacturer's recommended fittings and accessories.

g) Where surface raceway is provided for a secondary pathway from the outlet to the ceiling space, extend surface raceway into the ceiling space not less than 4 inches.

C. Telecommunications/power poles
   1. Mount straight and anchor to building structure above the ceiling line.
   2. Provide mounting hardware, entrance end fitting, and ceiling trim plate.

D. Cable Tray
   1. Planning
      a) Contractor shall plan entire cable tray system layout and all components required to provide a complete system, verifying dimensions and right-of-way clearances as needed.
      b) Design
         1) Wall mounted
            i) Where 12” capacity is indicated on the drawings a single tiered 12” rung size tray will be utilized.
            ii) Where 24” capacity is indicated on the drawings a two tiered 12” rung size tray will be utilized.
         2) Suspended
            i) Where 12” capacity is indicated on the drawings a double sided 6” rung size tray will be utilized.
            ii) Where 24” capacity is indicated on the drawings a double sided 12” rung size tray will be utilized.
   2. Coordination and positioning
      a) Coordinate positioning with other trades to assure maximum accessibility.
         1) Tray shall be mounted securely along the wall at a minimum of 6” (lower tier) above the ceiling line.
            i) Where two 12” trays connect to a two tier unit, the upper tray may continue at 12” (upper tier) above the accessible ceiling.
            ii) Where tray cannot be wall mounted, (transversing hallways, etc.) mount span securely to wall at each end and provide ½” threaded rod supports, anchored into the concrete deck above, every 4’ at minimum.
         2) Minimum access should be 12 inches clear above the tray (each tier) and 12 inches clear beside the tray to facilitate moves, adds and changes for telecommunications cabling.
   3. Installation
      a) Cable tray shall be routed as shown schematically by Contract Documents, run level and true to building lines.
      b) Changes in direction, changes in elevation, tees, crosses, and bends shall be made with manufactured fittings and accessories.
      c) Where conduits terminate above a cable tray, the conduit shall be provided with an insulating bushing.

d) Mounting heights shall be sufficient to clear light fixtures, piping, and equipment and permit ready access through lay-in ceiling grids. Do not install less than 6 inches above ceiling.

e) Cable tray shall be grounded by a separate stranded #6 AWG copper ground conductor attached to the building grounding electrode system and connected to nearest section of the cable tray with UL approved aluminum/copper termination.
   1) See "Grounding and Bonding" specification for further details.

f) Cable tray shall be installed in accessible area. Provide raceway system of equivalent cross section area of cable tray where ceiling system is not accessible.

g) Cable tray and all fittings and accessories shall effect a complete structural system in the form of a rigid mechanical tray of compatible material and design, functional to support all cabling.

h) Transition cable tray system around physical obstructions using manufacturer's recommended turns, sweeps, transition products, and materials to create a complete continuous cabling pathway free of obstructions and maintaining specified clearances.

i) Where physical discontinuity is necessary, mechanically support cabling over the discontinuity as specified. Bond the ends of the cable tray together electrically over any discontinuity.
   1) Fire-wall penetrations shall be made with 4" sleeves (4 per 12" of tray width minimum).
      i) Utilize requirements of the NFPA NEC to determine correct construction and sizing of wall penetration if tray is to penetrate fire rated wall.
   2) Ground and bond the system in accordance with the NEC and ANSI/TIA/EIA 607.
   3) Do not use copper fittings or hardware to connect any bonding conductor to aluminum cable tray.

j) Provide support for cable trays at a minimum of 4' 6" on center and at all splices, tees, elbows, bends, intersections, and transitions.
   1) Support with threaded rod and U-channel supports systems
      i) 12" width – ½" ATR; 24" width – 5/8" ATR
   2) Rod lengths over 6' will require a "Rod Stiffener" installation.
      i) A section of U-Channel stock is placed around the rod and stiffener clamp assemblies used to clamp to rod
         (A) Place clamps a minimum of 6" from the top and bottom of the rod and every 18" in between.

k) Install system free of all sharp edges, burrs, or projections.

l) Provide rung caps on rung ends as specified.

m) Provide waterfall fittings in every location that cable is designed to exit the tray downward at the end of a run or between the rungs.

n) Route parallel and perpendicular to building surfaces.
o) Mount cable tray in such a fashion as to be re-usable.
1) Install as straight and flat as practical and perpendicular to building lines.
i) Utilize manufactured 45 degree transitions up and down to change elevations.
ii) Utilize manufactured 45 or wide sweep 90 degree fittings to change route.
(A) Mount cable tray at approximately 6-12" above accessible ceiling.
(B) Locate in a position to allow at least 12" clearance on each side of the cable tray for access.

4. Install as a complete system in accordance with manufacturer's installation instructions indicated on the Drawings and to ensure electrical continuity of the system and adequate support for the cabling. Provide all manufacturer's recommended fittings and accessories.
5. Supports shall be attached to building structure.

E. Messenger Strand
1. Anchors shall be securely mounted to building structure at each end.
2. Tensioners shall be installed to connect strand.
3. Additional supports shall be installed with threaded rod from the deck above to support the strand approximately 6-8" above suspended ceiling in all locations.
a) Support with threaded rod and U-channel supports systems (See Accessories, Supporting Devices – Field Fabricated)
b) Properly sized.
1) Multiples of strands (100 horizontal cables each) appropriate to handle the required cable quantities plus 25% spare capacity.
2) Separate strand for Backbone cables.

F. Open top discreet cable supports (J-Hooks)
1. Primary pathways (corridors, vertical chases, etc.) plenum rated, adjustable cable support that complies with UL cUL, NEC, and ANSI/TIA/EIA requirements for structured cabling systems and accommodates up to 425 horizontal UTP cables or multiples of CAT32 (80 cables each) appropriate to handle the required cable quantities plus 25% spare capacity.
a) Install j-hook pathway, supporting at least every 5', as straight as possible perpendicular to building structure at approximately 12" above accessible ceiling.
b) Attachment of J-Hooks must be to building structure directly or utilize a minimum of ¼" all-thread rod anchored into deck above.

2. Secondary pathways (those extending from the primary pathways to the space above the telecommunications outlets) J-hooks with galvanized finish to provide smooth surface and corrosion resistance that complies with UL, cUL, NEC, and ANSI/TIA/EIA requirements for structured cabling systems and accommodates up to 16 horizontal UTP cables.
    a) Install j-hook pathway, supporting at least every 5', as straight as possible perpendicular to building structure at approximately 12" above accessible ceiling.
    b) Attachment of J-Hooks must be to building structure directly or utilize a minimum of ¼" all-thread rod anchored into deck above.
    c) Exception: Cable routes of less than ten 4 pair UTP (or equivalent weight) may be supported with ceiling grid support wiring when utilizing a support manufactured for that purpose.
        1) Must be supported every 5'
        2) Cannot interfere with the removal of the ceiling tile
        3) Must be installed approximately 12" above ceiling

3.3 BOXES

A. Outlet boxes:
1. Provide outlet boxes flush with the surface unless otherwise noted and properly centered in ceiling tiles, wall finishes, or casework elements. Heights as indicated or to match existing outlet boxes.
    a) Install all telecommunication video outlet with control for locations indiacted to be wall hung TV's or monitors 8 feet above finished floor or 12 inches below finished ceiling, whichever is lower.
2. Provide outlet boxes of a type appropriate for the use and location. Gang adjacent devices in multiple gang boxes under a common finish plate.
3. Boxes shall be securely and rigidly attached and supported plumb, level, and true to building lines by any of the following methods:
    a) Double bar installation for metal stud walls. Bar hanger punch, mounting clips, and retainer clips shall be used in strict accordance with manufacturer's instructions. Factory pre-punched stud holes shall not be used to support the bar hangers.
    b) Steel stud installed behind box for support without caddy-type mounting clips for metal stud wall construction.
    c) Caddy screw gun bracket installed behind box for support. Installation shall be per manufacturer's instructions.
4. Finish plates shall not span different types of wall finishes either vertically or horizontally. Plates shall cover mortar joints and cut openings completely.

5. Outlet, junction, and pull boxes and their covers shall have corrosion protection suitable for the atmosphere in which they are installed. Provide gaskets for all boxes installed outside or in other wet or damp locations (tunnels, crawlspaces, pits, etc.).
6. Outlet boxes shall be protected from plaster. Debris shall be thoroughly cleaned from the box before installation of conductors.
7. Floor boxes shall be installed flush and true with the floor.
8. Finish plates:
   a) Install a blank coverplate for each new or existing unused outlet box.

B. Junction and pull boxes
1. Provide junction and pull boxes as indicated in the Contract Documents and as required.
2. Provide junction and pull boxes in accessible spaces or behind access panels. Boxes located above snap-in or lay-in removable ceilings will be considered accessible.
3. Provide junction and pull boxes where necessary to facilitate the installation of raceways and pulling of wire or cable.
4. Provide junction and pull boxes sized in accordance with NEC and installed such that conduit entry will permit the longest radius for conductors contained therein.
5. Provide junction and pull boxes such that conduits enter and exit across from each other on opposite sides of the junction box. Do not provide junction and pull boxes in place of conduit bends.
6. Support all such boxes in accordance with the National Electrical Code.

C. Mounting heights
1. Exceptions:
   a) At junction of different materials in wall finishes.
   b) Where outlet would occur in moldings, break in wall surface or unsuitable location in the tile, wood, or similar finish.
   c) Where outlets would conflict with locations of wall-mounted equipment such as radiators, convectors, unit heaters, etc.
   d) As noted otherwise.
   e) Where electrical outlet on that wall is of different height.

3.4 PENETRATIONS THROUGH FLOORS AND WALLS

A. General:
   1. Provide, locate and set sleeves where conduit passes through floors, walls, and other concrete or masonry structural materials except where tunnels, chases or shafts are provided in the constructions.
      a) Sleeves through poured-in-place concrete floors shall be set before the pour and shall be of a design that will seal against passage of water between sleeves and concrete floor.
   2. Provide bushings on all conduit sleeves.
   3. Extend all wall sleeves a minimum of 2 inches or as required to allow the installation of conduit bushings.
   4. Extend floor sleeves 4-6 inches above finished floors unless otherwise specified.
   5. The void between the sleeve wall and conduit shall be neatly filled with an approved fire stop material.

B. Quantity and sizing:
   1. Penetrations through floors, access through walls of Equipment Rooms and/or Telecommunications Rooms, and obstructions along a backbone or primary horizontal cabling route.
      a) Provide the required quantity of 4 inch sleeve assemblies as specified with a minimum of one 4 inch sleeve. Properly firestop after installation of the telecommunications cabling.
      b) Install sizes and quantities as specifically noted on the prints, or the quantity required so as to accommodate all planned cables, not exceeding a 40 percent maximum fill ratio in each sleeve, plus one spare 4 inch sleeve.
   2. Penetrations through walls or along secondary horizontal cabling routes.
      a) Provide a 2 inch or 4 inch sleeve assembly as specified with a minimum of one 2 inch sleeve. Properly fire stop after installation of the telecommunications cabling.
      b) Install sizes and quantities as specifically noted on the prints, or the quantity required so as to accommodate all planned cables, not exceeding a 40 percent maximum fill ratio in each sleeve, plus one spare 4 inch sleeve.

C. Construction:
   1. All penetrations through floors or walls to allow Division 27 cable or pathway to pass through will require a UL listed device for the purpose of penetrating the construction.
      a) Concrete, block, brick, and gypsum drywall construction providing a fire rating of greater than one hour for walls and floors will require a UL rated sleeve assembly installed to manufacturer's requirements allowing the penetration(s) to not degrade the designed fire rating of the wall or floor.
         1) Each penetration will require a UL listed sleeve assembly installed by an installer trained on proper installation of the sleeving device.

2) Each penetration shall have the accompanying certification paperwork completely filled out and attached to the building structure adjacent to the penetration.

2. All other penetrations and gypsum drywall constructed walls providing a fire rating of one hour or less will require a UL rated sleeve assembly installed to manufacturer's requirements allowing the penetration(s) to not degrade the designed fire rating of the wall or floor.
   a) Each penetration will require a UL listed sleeve assembly installed by an installer trained on proper installation of the sleeving device.
   b) Each penetration shall have the accompanying certification paperwork completely filled out and attached to the building structure adjacent to the penetration. A copy of this paperwork will be required in the O & M Manual.
3. All penetrations found to be improperly sleeved after the installation of cabling will be sleeved and firestopped to restore the proper aesthetics and required fire rating to the obstruction.
   a) Each penetration will require a UL listed sleeve assembly installed by an installer trained on proper installation of the sleeving device.
   b) Each penetration shall have the accompanying certification paperwork completely filled out and attached to the building structure adjacent to the penetration. A copy of this paperwork will be required in the O & M Manual.
4. All penetrations required in gypsum board walls for installation of horizontal cabling, where conduit is not stubbed into the ceiling cavity for this purpose, will require a sleeved penetration through the drywall membrane or the wall cap.
5. Each penetration will require a UL listed sleeve assembly installed by an installer trained on proper installation of the sleeving device.

3.5 SUPPORTS

A. General:
   1. Coatings
      a) Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.
      b) Concrete and masonry anchors
         1) Shall be a guaranteed anchoring system with field training available.
            i) All onsite personnel will be required to be manufacturer trained on the anchoring system being utilized, and upon request, to show proof of manufacturer's training certification.

B. Manufactured supporting devices:
   1. Raceway supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.
   2. Fasteners: Types, materials, and construction features as follows:
      a) Expansion anchors: Carbon steel wedge or sleeve type
      b) Toggle bolts: All steel springhead type
      c) Powder-driven threaded studs: Heat-treated steel, designed specifically for the intended service
   3. Conduit sealing bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
   4. Cable supports for vertical conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.
   5. U-channel systems: 16-gauge steel channels, with 9/16 inch diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

C. Fabricated supporting devices:
   1. General: Shop or field-fabricated supports or manufactured supports assembled from U-channel components.
   2. Steel brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.
   3. Raceway supports: Comply with the NEC and the following requirements.
      a) Conform to the manufacturer's recommendations for selection and installation of supports.
      b) Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lbs. provide additional strength until there is a minimum of 200 lbs. safety allowance in the strength of each support.
      c) Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
      d) Support parallel runs of horizontal raceways together on trapeze-type hangers.

e) Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers for 1 ½ inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use ¼ inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

f) Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.

g) In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

4. Miscellaneous supports:

a) Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, pull boxes, junction boxes, and other devices.

b) Support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.

5. Conduit seals:

a) Install seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.

6. Fastening:

a) Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to; conduits, raceways, cables, cable traps, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with the following:

1) Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.

2) Holes cut to depth of more than 1 ½ inch in reinforced concrete beams or to depth of more than ¾ inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
3) Ensure that the load applied to any fasteners does not exceed 25 percent of the proof test load. Use vibration-and shock-resistant fasteners for attachments to concrete slabs.

7. Raceway supports: Hanger spacing shall be as required for proper and adequate support of raceway, but in no case shall be less than one hanger per 5 feet of raceway length.

END OF SECTION

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FIRESTOPPING FOR COMMUNICATIONS SYSTEMS

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. **Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.**

1.2 SUMMARY

A. Section Includes:

1. **This Section is a "Common Work Results" Section that includes information that is applicable and "Related" to all Division 27 Sections.**
    a) Refer to related Section 27 05 28 "Pathways for Communications Systems" for Sleeving requirements.
    b) This Section includes firestopping for the following:
        1) Penetrations through fire-resistance/-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
        2) Penetrations through fire-resistance/-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
        3) Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
        4) Sealant joints in fire-resistance/-rated construction.
    c) Label each firestopped sleeve with the label furnished with the sleeve assembly; each certification label shall be copied and added to the O & M Manual.
2. **System includes but is not limited to:**
    a) Firestopping Compounds

B. Related Sections

1. **All Division 27 Sections**

C. Related Drawings

1. **Technology (T-Series) Drawings**

1.3 GENERAL INFORMATION

A. Definitions:

1. Firestopping

a) A material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flames, smoke, and/or hot gasses through penetrations in fire-rated wall and floor assemblies.

B. All Work shall fully comply with these specifications and related Drawings and all manufacturers recommended installation practices.

1.4 SYSTEM DESCRITION / DESCRIPTION OF WORK

A. General:

1. Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gasses.

2. Firestopping may be factory installed in a re-usable sleeve assembly or may be a removable/ re-usable material(s) inserted into a sleeve assembly to provide adequate protection.

3. Refer to related Division 27 Section "Pathways for Communications Systems" for Sleeving requirements.

B. Fire stopping requirements/locations are not indicated on drawings. It shall be the responsibility of this contractor to review all architectural and other drawings to determine fire/smoke rated walls and floors and rating requirements of same. This contractor shall provide all required fire stopping work associated with all Division 27 penetrations. Provide fire stop pillows, putty and/or sealant, as applicable, with minimum UL classification for 1 hour fire and cold side temperature ratings.

1. At a minimum, provide firestopping to equal or exceed the rating of the wall or floor.

2. Provide Fire Stop Putty equal to Nelson FSP #AA400 series, or by 3M Fire Protection Products; Fire Protection Services, Inc.; UL Classified for 3 hour fire and cold side temperature ratings, reusable when penetrating items are removed or added and requiring no special tools, mixing, curing or drying time.

C. System Performance requirements:

1. Provide re-usable firestopping system(s) in all backbone pathway and major horizontal routes.

2. F-rated through-penetration firestop systems:

a) Provide through-penetration firestop systems with F rating indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

3. **T-rated through-penetration firestop systems:**
   a) Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814 where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupied floor areas. T-rated assemblies are required where the following conditions exist:
      1) Firestop systems protect penetrations located outside of wall cavities.
      2) Firestop systems protect penetrations located outside fire-resistive shaft enclosures.
      3) Firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
      4) Firestop systems protect penetrating items larger than a 4-inch (100 mm) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.
4. **Fire-resistive joint sealants:**
   a) Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
5. **For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.**
   a) For floor penetrations with annular spaces exceeding 4 inches (100 mm) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floorloads involved either by installing floor plates or by other means.
   b) For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
6. **For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.**

1.5 SUBMITTALS

A. General
1. **Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.**
2. **Samples shall be submitted with or immediately following submission of Product Data submittals.**

B. Items to be submitted for approval prior to commencement of work:
   1. **Product Data**
      a) Manufacture datasheets for all items
         1) Data sheets shall include
            i) Manufacturer name
            ii) Manufacturer model number (as it appears on manufacturer's product data sheet)
            iii) Manufacturer product description
            iv) Paragraph number of this section where the product is specified.
   2. **Shop Drawings**
      a) System block wiring diagram, detailed.

C. Quality Assurance / Control Submittals
   1. **RCDD Certification for the staff member responsible for this project.**
   2. **Resume of the last 10 projects of the RCDD responsible for this project**
   3. **BICSI Technician's certificate for each lead Technician(s) on the project**

D. Closeout Submittal
   1. **Manufacturer's Material Safety Data Sheets (MSDS) for each item.**
   2. **Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.**

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

A. General
   1. **This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.**
   2. **This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the Products section that are not required under the scope of this contract.**

2.2 FIRESTOPPING, GENERAL

A. Compatibility:
   1. **Provide firestopping components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.**

B. Accessories:

1. Provide components for each firestopping system required to install fill materials and to comply with "System Performance Requirements" Article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Firestopping materials shall be asbestos-free and shall not contain flammable solvents. Accessories include but are not limited to the following:

a) Permanent forming/damming/backing materials including the following:
   1) Semi-refractory fiber (mineral wool) insulation
   2) Ceramic fiber
   3) Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state
   4) Fire-rated formboard
   5) Joint fillers for joint sealants

b) Temporary forming materials

c) Substrate primers

d) Collars

e) Steel sleeves

C. Applications:

1. Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

A. Subject to compliance with requirements, provide one or more of the following types:

B. Ceramic-fiber and mastic coating:

1. Ceramic fibers in bulk form formulated for use with mastic coating and ceramic fiber manufacturer's mastic coating.

a) Standard of quality shall be 3M Fire Protection Products
   1) Additional approved manufacturer(s): Thermal Ceramics, FireMaster Bulk, FireMaster Mastic

C. Ceramic-fiber sealant:

1. Single-component formulation of ceramic fibers and inorganic binders.

a) Standard of quality shall be 3M Fire Protection Products
   1) Additional approved manufacturer(s): Metacaulk 525, The RectorSeal Corporation

D. Endothermic, latex compound sealant:
   1. **Single-component, endothermic, latex formulation.**
      a) Standard of quality shall be 3M Fire Protection Products
         1) Additional approved manufacturer(s): Fyre-Shield, Tremco Inc., Flame-Safe FS500/600 Series, International Protective Coatings Corp., Flame-Safe FS900/FST900 Series, International Protective Coating Corp., Cafco TYPS Type 1, Isolatek International, STI LC150, Specified Technologies, Inc.

E. Intumescent, latex sealant:
   1. **Single-component, intumescent latex formulation.**
      a) Standard of quality shall be Fire Barrier CP 25WB Caulk, 3M Fire Protection Products
         1) Additional approved manufacturer(s): Metacaulk 950, The RectorSeal Corporation, Cafco TPS Type 1, Isolatek International, STI SSS100, Specified Technologies, Inc., Hilti

F. Intumescent putty:
   1. **Nonhardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.**
      a) Standard of quality shall be Fire Barrier Moldable Putty, 3M Fire Protection Products
         1) Additional approved manufacturer(s): Intumescent Putty, General Electric Co., Flame-Safe FSP1000 Putty, International Protective Coatings Corp., Cafco TPS Types P and EP, Isolatek International, Hilti

G. Intumescent wrap strips:
   1. **Single-component, elastomeric sheet with aluminum foil on one side.**
      a) Standard of quality shall be Fire Barrier FS-195 Wrap/Strip, 3M Fire Protection Products
         1) Additional approved manufacturer(s): CS2420 intumescent wrap, Hilti Construction Chemicals, Inc., STI SSW Red, Specified Technologies, Inc.

H. Pillows/bags:
   1. **Reusable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.**
      a) Standard of quality shall be Firestop Pillows, Bio Fireshield, Inc.
         1) Additional approved manufacturer(s): KBS Sealbags, International Protective Coatings Corp., SSB Pillows, Specified Technologies, Inc., 3M Fire Protection Products

I. Intumescent collars:
   a) Standard of quality shall be Cafco TPS Type D, Isolated International
   b) Additional approved manufacturer(s):STI SSC Collars, Specified Technologies, Inc., 3M Fire Protection Products

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

A. Elastomeric sealant standard:
   1. Provide manufacturer's standard chemically curing, elastomeric sealants for base polymer indicated that complies with ASTM C 920 requirements, including those referenced for type, grade, class, and uses; and requirements specified in this Section applicable to fire-resistive joint sealants.

B. Single-component, neutral-curing silicone sealant:
   1. Type S, Grade NS, Class 25, exposure-related Use NT, and joint-substrate related Uses M, G, A, and (as applicable to joint substrates indicated) O.
      a) Additional movement capability:
         1) Provide sealant with the capability to withstand the following percentage changes in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated:
            i) 50 percent movement in both extension and compression for a total of 100 percent movement.
            ii) 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

C. Single-component, nonsag, urethane sealant:
   1. Type S, Grade NS, Class 25, and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

D. Products: Subject to compliance with requirements, provide one of the following:
   1. Single-component, neutral-curing, silicone sealant:
      a) Dow Corning 790, Dow Corning Corp.
      b) Dow Corning 795, Dow Corning Corp.
      c) Silpruf, General Electric Co.
      d) Ultraglaze, General Electric Co.
      e) Omniseal, Sonneborn Building Products Div. Chem Rex, Inc.
      f) Hilti
      g) FS-One

2. Single-component, nonsag, urethane sealant:

a) Isoflex 880 GB, Harry S. Peterson Co., Inc.
b) Isoflex 881, Harry S. Peterson Co., Inc.
c) Vulkem 921, Mameco International Inc.
d) Sikaflex-15LM, Sika Corp.
e) NP-1, Sonneborn building Products Civ., Chem Rex, Inc.

2.5 FIRE STOPPING FOR ALL OTHER WALL AND FLOOR OPENINGS

A. Provide Fire Stop Sealant shall be equal to Nelson #AA491 series, or by 3M Fire Protection Products; Fire Protection Services, Inc.; UL Classified for 3 hour fire and cold side temperature ratings, non-sagging, permanently flexible, non-toxic, non-shrinking, water/air/smoke-tight and easily re-penetrated. The following shall be considered equal.

1. For Floor Openings: Instant Firestop; 305-SL.
2. For Wall Openings: Instant Firestop; 344-GG.
3. Mineral Felt: Instant Firestop; Type MW.
4. For Insulated Pipes: Instant Firestop; Type PI.
5. For Fill Areas: Instant Firestop; C-1000.

B. Apply sealant primer to substrates as recommended by manufacturer (if any). Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

C. Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Environmental conditions:

1. Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilation:

1. Ventilate firestopping compounds per manufacturers' instructions by natural means or, when this is inadequate, forced air circulation.

3.2 SEQUENCING AND SCHEDULING

A. Do not cover up those firestopping installations that will become concealed behind other construction until the Architect/Engineer/Consultant has examined each installation

3.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to the Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.

1. Coordinate the delivery date of firestopping materials with the scheduled date of installation to minimize amount of storage time required at the Project site.

2. Store with a copy of the manufacturers MSDS sheet.

a) Submit a copy of each sheet to the site manager.

B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

C. **Damaged or expired materials shall be removed from the site and shall not be used in the Work**.

3.4 FIRE-TEST-RESPONSE CHARACTERISTICS: PROVIDE FIRESTOPPING THAT COMPLIES WITH THE FOLLOWING REQUIREMENTS AND THOSE SPECIFIED IN THE "SYSTEM PERFORMANCE REQUIREMENTS" ARTICLE IN THIS SECTION.

A. Firestopping tests are to be performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is an agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.

B. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water (2.5 Pa) is maintained at a distance of 0.78 inch (20 mm) below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

1. Through-penetration firestop system products shall bear classification marking of qualified testing and inspecting agency.

2. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory," by Warnock Hersey, or by another qualified testing and inspecting agency.

C. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water (2.5 Pa) as measured 0.78 inch (20 mm) from the face exposed to furnace fire. Provide systems complying with the following requirements:

1. **Fire-resistance rating of joint sealants**
   a) As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
2. **Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.**

D. Where no UL test firestop application exists, manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation.

E. Firestopping systems and their locations in the Project are not specifically indicated in the Drawings.

F. It is the sole responsibility of the Firestopping Contractor to install tested and approved systems that comply with all applicable codes, standards and/or agencies having jurisdiction.

3.5 INSTALLER QUALIFICATIONS:

A. Engage an installer with not less than two years experience in the installation of firestopping similar in material, design, and extent to that indicated for this Project.

3.6 SINGLE-SOURCE RESPONSIBILITY:

A. Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

3.7 PROVIDE FIRESTOPPING PRODUCTS CONTAINING NO DETECTABLE ASBESTOS AS DETERMINED BY THE METHOD SPECIFIED IN 40 CFR PART 763, SUBPART F, APPENDIX A, SECTION 1, "POLARIZED LIGHT MICROSCOPY."

3.8 COORDINATING WORK:

A. Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

3.9 EXAMINATION

A. Examine substrates and conditions with installer present for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.10 PREPARATION

A. Surface cleaning:

1. Clean out openings and joints immediately before installation of firestopping to comply with firestopping manufacturer's recommendations and the following requirements:

a) Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

b) Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

c) Remove laitance and form release agents from concrete.

B. Masking tape:

1. Use masking tape to prevent firestopping from contact with the following:

a) Adjoining surfaces that will remain exposed upon completion of Work.

b) Surfaces that would otherwise be permanently stained or damaged by such contact or cleaning methods used to remove smears from firestopping materials.

2. Remove tape as soon as it is possible to do so without disturbing firestopping seal with substrates.

3.11 GENERAL FIRE STOPPING MATERIAL APPLICATION

A. Clean all affected surfaces, joints, etc. immediately before applying fire stopping to comply with recommendations of manufacturer.

B. Comply with fire stop material manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

C. Install fire stop materials, including forming, packing, and other accessory materials, to fill openings around services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

D. Caulk between sleeves and pipes with rockwool and caulk around sleeves with sealing compound. Material must meet all applicable fire ratings required.

E. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch.

F. Where a smoke and/or fire-resistance classification is indicated on architectural drawings or otherwise, provide the following as applicable.

G. Fire stop pillows, putty and/or sealant with minimum UL classification for 3 hour fire and cold side temperature ratings for all penetrations.

H. Access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating required; Provide UL Label on each fire-rated access door.

I. Wall and Floor Opening Fire Stopping for Open Cable Tray or J-Hook Paths

J. Provide Fire Stop Pillows equal to Nelson FSP #AA500 PLW or #AA501 PLW or by Fire Protection Services, Inc.; 3M Fire Protection Products as required, UL Classified for 3 hour fire and cold side temperature ratings, quickly removable and reusable, non-toxic and requiring no special tools.

K. Wall & Floor Opening Fire Stopping for Work Likely to Require Ongoing Moves, Adds and Changes

L. All Work shall comply with manufacturer's written installation instructions.

1. **Seal all holes to ensure a flame/gas/smoke resistant seal.**
2. **Do not permit UL firestop systems to hamper the performance of fire dampers in ductwork.**

3.12 INSTALLING THROUGH-PENETRATION FIRESTOPS

A. General:

1. **Comply with the "System Performance Requirements" Article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.**

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

1. **Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.**
2. **Apply materials so they contact and adhere to substrates formed by openings and penetrating items.**

3.13 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

A. General:

1. **Comply with the "System Performance Requirements" Article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.**

B. Install joint fillers to provide support of sealants during application and at the position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.

C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width at optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

D. Tool nonsag sealants immediately after sealant application and before skinning or curing begins. Form smooth, uniform beads of configuration indicated or as required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or that are not approved by the sealant manufacturer.

3.14 FIELD QUALITY CONTROL

A. Do not proceed to enclose firestopping with other construction until examinations are completed.

B. Where deficiencies are found, repair or replace firestopping at no additional expense to the Owner so that Work complies with requirements.

3.15 CLEANING

A. Remove excess fill materials and sealants adjacent to openings and joints as Work progresses. Use methods and cleaning materials approved by manufacturers of firestopping products and products in which openings and joints occur. Return all surfaces to their original condition.

B. During and after the curing period, protect firestopping from contact with contaminating substances and from damage resulting from construction operations or other causes so that they are without deterioration or damage or at time of Substantial Completion.

1. **If damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.**

END OF SECTION

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IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. Labeling of Communications Systems
   2. Labeling of Life Safety and Security Systems
      a) This Section is a "Common Work Results" Section that includes information that is applicable and "Related" to all Division 27 Sections.
   3. System includes but is not limited to:
      a) Labels

B. Related Sections
   1. All Division 27 Sections

C. Related Drawings
   1. Technology (T-Series) Drawings

1.3 REFERENCES

A. "TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL" published by the Building Industry Consulting Services International (BISCI).

1.4 SYSTEM DESCRIPTION / DESCRIPTION OF WORK

A. Furnish and install labeling for all Communication products, including but not limited to:
   1. Patch panels
   2. Device plates
   3. Cabling
   4. Equipment racks
   5. Building Distribution Frame <BDF>/Entrance Facility <EF>
   6. Equipment room(s) <ERxxxx>
   7. Telecommunications room(s) <TRxxx>
   8. Structured cabling, including horizontal and backbone cabling

9. Communications cabling cross-connects
10. Communications backboards

B. Labeling system shall be an ANSI/TIA/EIA-606 compliant system - The Administrative Standard for the Telecommunications Infrastructure of Commercial Building Identification System.
   1. See Drawings for graphical representation.

1.5 SUBMITTALS

A. General
   1. Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.
   2. Samples shall be submitted with or immediately following submission of Product Data submittals.

B. Product Data
   1. Manufacture datasheets for all labels

C. Shop Drawings
   1. Labeling system diagram, detailed.

D. Quality Assurance
   1. RCDD Certificate for the Contractor's staff member(s) with ultimate responsibility for ensuring Contractor compliance with work of this section.
   2. BISCI Technician Certificate for the technicians performing work of this section

E. Closeout Submittals
   1. A diagram of the labeling scheme used on the Project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Brady
B. Panduit
C. Hellerman/Tyton
D. Brother

2.2 GENERAL

1. This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.
2. This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the Products section that are not required under the scope of this contract.
3. Products required by the Drawings but not listed in Part 2, will be evaluated as a performance specification based on the information provided on the Drawings.

2.3 LABELS

A. Labels
   1. Labels shall have a white background and black print.
   2. Provide alphanumeric, clearly typewritten labels at all designated points as follows:
      a) Horizontal Cables
         1) 4 pair UTP cables
            i) Standard of quality shall be Brady PTL-31-642
         2) 4 pair STP cables
            i) Standard of quality shall be Brady PTL-21-642
         3) RG-6 Coaxial
            i) Standard of quality shall be Brady PTL-31-642
      b) Telecommunications outlet port
         1) Standard of quality shall be Panduit PLL-46-Y2-1
      c) Telecommunications outlet faceplate:
         1) Standard of quality shall be Panduit JLEFPS-1
      d) Patch panel ports
         1) Standard of quality shall be Panduit JLCPL-1
      e) Patch Panels
         1) Standard of quality shall be Brady PTL-20-422
      f) Backbone cables
         1) 100 pair Copper cables
            i) Standard of quality shall be Brady PTL-34-642
         2) Fiber Optic Cables
            i) Standard of quality shall be Brady PTL-21-642
         3) Cable Bundles
            i) Standard of quality shall be Brady PTL-12-109
         4) 110 style blocks
            i) Standard of quality shall be Panduit DSL-110
            ii) Use with Panduit P110LH
         5) Telecommunications Backboards
            i) Standard of quality shall be Brady PTL-37-422

6) Racks and Cabinets
   i) Standard of quality shall be Brady PTL-42-422

PART 3 EXECUTION

3.1 GENERAL

A. This section is designed to provide the vendor with a standard of quality and functionality for the installation of technology systems infrastructure. Not all procedures will be necessary for the installation of this Project. However, this standard will be considered in force for the original response as well as for any additions or changes to this Project.

B. Contractor SHALL work with Owners Telecommunications representative to gain approval of labeling plan BEFORE any cable labeling is started.

C. Jacks in patch panels shall be installed with room numbers in sequential numerical order and in floor order.

3.2 INSTALLATION

A. Labels

1. Apply all labels shall be installed parallel to the dominate visual lines of the product being labeled.
2. Labels shall be clearly legible and appropriately sized for the application.
3. Provide alphanumeric, clearly typewritten labels at all designated points as follows:
   a) See for graphical representation of labeling scheme.
   b) Horizontal cabling:
      1) Cabling to ER/TR from outlets and devices
         i) ER/TR # - Outlet Room Number - Patch Panel #/Port #.
         ii) Example: ER01-211-B22 where Equipment Room is identified as ER01, the cable travels to room 211 and the cable is landed on patch panel B position 22 (of 48) in the ER.
         iii) Locate label on cable jacket between 3 and 6 inches of each end of the cable.
      2) Cabling between horizontal outlets/devices
         i) Label local input cables.
         ii) Locate label on cable jacket between 3 and 6 inches of each end of the cable.
         iii) Label each cable as to its signal type, purpose, and destination. Add a numeric suffix to uniquely identify multiple cables of duplicate signal type, purpose or destination.

c) Telecommunications outlet ports and faceplates:
   1) ER/TR# - Outlet Room Number – Patch panel #/ Jack #.
   2) Example: ER01-211 faceplate number and B22 through B25 jack numbers for a 4 port faceplate where Equipment Room is identified as ER01, the cable is landed on patch panel B position 22 through 25 (of 48) in the ER and travels to room 211.
   3) Locate the faceplate label, excluding the jack designation at the top of the faceplate. Locate the individual jack designation numbers immediately above each jack on the faceplate.
   4) Label local input terminations as follows: F Connector – Camera, RCA yellow – Local Video, RCA white – L Audio, RCA red– R Audio, BNC – Local Video, Horizontal UTP – Local Control.

d) Patch panels and patch panel ports:
   1) Label each patch panel A-Z, top-to-bottom
      i) Locate label on the front upper left corner of all patch panels
   2) Locate on the front of all patch panels, directly above or below (as indicated by the manufacturer) each jack position (1 through 24) in the patch panel; place the room number corresponding to the room number used on the faceplate for each port.
   3) Labeling shall be in numerical order and correspond to the telecommunications outlet faceplate scheme.

e) Backbone cabling:
   1) Service designation – ER#/TR#.
   2) Service designation – CB = Copper Backbone, FB = Fiber Backbone, VB = Video Backbone. Example: CB – ER01/TR02.
   3) Locate label on cable jacket within 6 inches of each end of the cable and at key pull points along pathway.

f) Cross-connect blocks, 110 style
   1) Locate on the front of all patch panels directly above or below (as indicated by the manufacturer) each position in the block.
   2) Labeling shall be in numerical order and correspond to the telecommunications outlet faceplate scheme or opposite end labeling dependant on use.
   3) Label the upper left corner of each block designating the service of that particular block. Do not terminate mixed services on the same block.

g) Cross-connect blocks, 66 style
   1) Locate on the front of all patch panels directly above or below (as indicated by the manufacturer) each position in the block.
   2) Labeling shall be in numerical order and correspond to the telecommunications outlet faceplate scheme or opposite end labeling dependant on use.
   3) Label the upper left corner of each block designating the service of that particular block. Do not terminate mixed services on the same block.

h) Communications Backboards (TBB)
   1) Backboard # with the prefix TBB, followed by the numeric backboard number in the room, followed by the suffix identifying the room in which the backboard is located. Example: TBB–01-ER-xxx.
   2) Label each 4'x8' sheet and each partial sheet, in numerical order left-to-right as facing the front of the backboards.

i) Equipment Racks
   1) Device ID. Example: ER01 – 02.
   2) Label each cabinet/rack in numerical order left-to-right as facing front of cabinet/rack bays.

j) Telephone Patch Cables
   1) Labeled with the same unique identifier at both ends of the assembly.

3.3 TRAINING

A. Conduct a walk through of the project site and demonstrate the presence and location of all key labeling elements used.
B. Furnish handouts to all owner personnel attending training that clearly depicts the labeling schema used on the project.

END OF SECTION

Revised 11/18/2019

VERIFICATION TESTING OF STRUCTURED CABLING

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. The work covered by this Specification Section includes any and all requirements for this type work required for proper Commissioning of work specified in each related Division 27 Specification Section and/or as shown on the Drawings.
   2. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing of the work called for in the Contract Documents.
      a) This Section is a "Common Work Results" Section that includes information that is applicable and "Related" to all Division 27 Sections.

B. Related Sections
   1. All Division 27 Sections

C. Related Drawings
   1. Technology (T-Series) Drawings

1.3 REFERENCES

A. All testing procedures and field-test instruments shall comply with applicable requirements of:
   1. ANSI Z136.2, ANS For Safe Use Of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources
   2. ANSI/EIA/TIA-455-50B, Light Launch Conditions For Long-Length Graded-Index Optical Fiber Spectral Attenuation Measurements
   3. ANSI/TIA/EIA-455-59A, Measurement of Fiber Point Discontinuities Using an OTDR.
   4. ANSI/TIA/EIA-455-133A, Measurement of Fiber or Cable Length Using an OTDR.
   5. ANSI/TIA/EIA-455-61A, Measurement of Fiber or Cable Attenuation Using an OTDR.

6. ANSI/TIA/EIA-526-7, Optical Power Loss Measurements of Installed Singlemode Fiber Cable Plant.
7. ANSI/TIA/EIA-526-14-A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
8. ANSI/TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard,
9. TIA/EIA TSB-140, Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.

B. ANSI/TIA/EIA-568-C.2 – Balanced Twisted Pair Telecommunications Cabling and Components Standard
C. ANSI/TIA/EIA-568-C.3 – Optical Fiber Cabling Components Standard
D. ANSI/TIA/EIA-568-C.4 – Standard on Coaxial Cabling Components
E. "TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL" published by the Building Industry Consulting Services International (BISCI).

1.4 SYSTEM DESCRIPTION / DESCRIPTION OF WORK

A. General
1. Testing shall be carried out in accordance with this document.
2. Testing shall be performed on each cabling link (connector to connector).
3. Testing shall not include any active devices or passive devices within the link other than cable, connectors, and splices.
a) Link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
4. Contractor shall maintain and provide to ISU a Microsoft Excel spreadsheet in electronic format of all connections installed with the following fields filled out. ***NO DATA PORTS WILL BE ACTIVATED UNTIL THIS SHEET IS PROVIDED FULLY FILLED OUT TO OWNER***:
a) Room Number
b) Jack Label
c) Wire label
d) IDF Room Number
e) Rack Label for patch panel
f) Patch Panel label
g) Patch panel port
h) Cable Length
i) Data switch rack label (if connected to data switch)
j) Data switch label (if connected to data switch)
k) Data switch port number (if connected to data switch)

B. Copper (Twisted Pair) Testing
1. Copper Cat 6A Installation: field test requirements upon completion of the installation
a) General Requirements (Category 6A)

1) Every cabling link in the installation shall be tested in accordance with the field test specifications defined in ANSI/TIA/EIA-568B-2.10*"Transmission Performance Specifications for 4-pair 100*Ω *Category 6A Cabling".* This document will be referred to as the "TIA Cat 6A Standard."
2) The installed twisted-pair horizontal links shall be tested from the MDF/IDF (ER/TR) in the telecommunications room to the telecommunication wall outlet in the work area against the "*Permanent Link*" performance limits specification as defined in the TIA Cat 6A Standard.

3) One hundred percent of the installed cabling links must be tested and must pass the requirements of the standards mentioned above and as further detailed in Part 3. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation (below).

b) Qualifications
1) Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. Appropriate training programs include but are not limited to installation certification programs provided by BiCSi or the ACP (Association of Cabling Professionals).

c) Coordination/Verification:
1) A representative of the Owner shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five business days before testing commences.
2) A representative of the Owner may elect to select a random sample of 5% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links and the results are to be stored in accordance with the prescriptions in Section A.3. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative ***shall repeat 100% testing and the cost shall be borne by the installation contractor.***

C. FIBER OPTIC Testing
1. GENERAL
a) The testing Tier shall be as indicated on the Detail Drawings.
1) Testing Tiers requirements are as described below.
2) If not otherwise noted:

i) All fiber optic Intra-Building Links shall be tested as Tier 1.
ii) All fiber optic Inter-Building Links shall be tested as Tier 2.

b) Every fiber optic cabling link in the installation shall be tested in accordance with the field test specifications defined by the Telecommunications Industry Association (TIA) standards ANSI/TIA/EIA-568-C.1, "*Commercial Building Telecommunications Cabling Standard, Part 1, General Requirements*," and TIA/EIA TSB140, "*Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems*."

c) ANSI/TIA/EIA-568-B.1, defines the passive cabling network, to include cable, connectors, and splices (if present), between two optical fiber patch panels (connecting hardware). The test does not, however, include the performance of the connector at the interface with the test equipment.

d) 100% of the installed cabling links must be tested and must pass the requirements as specified within this document. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation in accordance Part 3.

e) The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests in Part 3.

f) A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.

2. Qualifications

a) Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization.

1) Manufacturer of the fiber optic cable and/or the fiber optic connectors.
2) Manufacturer of the test equipment used for the field certification.
3) Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

3. Coordination/Verification

a) The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1) The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.

2) The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, ***the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.***

3) All tests shall be documented including OLTS dual wavelength attenuation measurements for multimode and singlemode links and channels and OTDR traces and event tables for multimode and singlemode links and channels.

4. Acceptance of test results.
   a) Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in compliance with the following test limits:
      1) Optical loss testing
         i) Backbone (multimode and singlemode) link
            (A) The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA/EIA-568-B.1.
               (1) Link Attenuation (dB) = Cable_Attn (dB) + Connector_Attn (dB) + Splice_Attn (dB)
               (2) Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)
               (3) Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
               (4) Maximum allowable connector_loss = 0.75 dB
               (5) Splice_Attn (dB) = number_of_splices * splice_loss (dB)
               (6) Maximum allowable splice_loss = 0.3 dB
               (7) The values for the Attenuation_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5	1300	1.5
Multimode 50/125 µm	850	3.5	1300	1.5
Single-mode (Inside plant)	1310	1.0	1550	1.0
Single-mode (Outside plant)	1310	0.5	1550	0.5

         ii) Horizontal (multimode) link

(A) The acceptable link attenuation for a multimode horizontal optical fiber cabling system is based on the maximum 90 m (295 ft) distance.
(B) The horizontal link may be tested using a fixed upper limit for attenuation of 2.0 dB. This value is based on the loss of two (2) connector pairs, one pair at the telecommunications outlet/connector and one pair at the horizontal cross-connect, plus 90 m (295 ft) of optical fiber cable.
(C) A horizontal link in an Open Office Cabling network with a consolidation point may be tested using a fixed upper limit for attenuation of 2.75 dB.

iii) Centralized (multimode) link
(A) The acceptable link attenuation for a multimode centralized optical fiber cabling system is based on the maximum 300 m (984 ft) distance.
(B) The centralized link may be tested using a fixed upper limit for attenuation of 3.3 dB. This value is based on the loss of three (3) connector pairs, one pair at the telecommunications outlet/connector, one pair at the consolidation point and one pair at the horizontal cross-connect, plus 300 m (984 ft) of optical fiber cable.
(C) A horizontal link in an Open Office Cabling network with a consolidation point may be tested using a fixed upper limit for attenuation of 4.1 dB.

2) OTDR testing
i) Reflective events (connections) shall not exceed 0.75 dB.
ii) Non-reflective events (splices) shall not exceed 0.3 dB.

3) Magnified endface inspection
i) Fiber connections shall be visually inspected for endface quality.
ii) Scratched, pitted or dirty connectors shall be diagnosed and corrected.

b) All installed cabling links and channels shall be field-tested and pass the test requirements and analysis as described in Part 3. Any link or channel that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation in accordance with Part 3.

c) Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

1.5 SUBMITTALS

A. General
   1. Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.
   2. Samples shall be submitted with or immediately following submission of Product Data submittals.

B. Equipment Data
   1. Manufacture datasheets for all twisted pair test equipment
   2. Manufacturers datasheets for fiber optic field-test instruments including optical loss test sets (OLTS; power meter and source), optical time domain reflectometer (OTDR) and inspection scope as applicable.

C. Quality Assurance / Control Submittals
   1. RCDD Certification for the staff member responsible for this project.
   2. Resume of the last 10 projects of the RCDD responsible for this project
   3. BICSI Technician's certificate for each lead Technician(s) on the project

D. Closeout Submittal
   1. Copper (Twisted Pair) Test Result Documentation
      a) The test result information for each link shall be recorded in the memory of the field tester upon completion of the test.
      b) The test result records saved by the tester shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records. A guarantee must be made that these results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test. The popular 'csv' format (comma separated value format) does not provide adequate protection and shall not be acceptable unless specified by the end user.
      c) The database for the completed job, including twisted-pair copper cabling links if applicable, shall be stored and delivered on USB flash drive. This USB flash drive shall include the software tools required to view, inspect, and print any selection of test reports.
      d) Circuit IDs reported by the test instrument shall match the specified label ID.
      e) A copy of the test results shall be provided that lists all the links that have been tested with the following summary information. The copy may be delivered on paper or electronically as specified by the end user.
         1) The identification of the link in accordance with the naming convention defined in the overall system documentation
         2) The overall Pass/Fail evaluation of the link-under-test
         3) The date and time the test results were saved in the memory of the tester

f) General Information to be provided in the electronic data base containing the test result information for each link:
   1) The identification of the customer site as specified by the end-user
   2) The overall Pass/Fail evaluation of the link-under-test
   3) The name of the standard selected to execute the stored test results
   4) The value of the NVP of the cable installed; used for length calculations
   5) The date and time the test results were saved in the memory of the tester
   6) The brand name, model and serial number of the tester
   7) The revision of the tester software and the revision of the test standards database in the tester

g) The detailed test results data to be provided in the electronic database for each tested link must contain the information as set forth in Part 3.

2. Fiber Optic Test Result Documentation

a) The OLTS and OTDR test result information for each link shall be recorded in the memory of the field tester upon completion of the test.

b) The test result records saved by the tester shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records. A guarantee must be made that these results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test. The popular 'csv' format (comma separated value format) does not provide adequate protection and shall not be acceptable unless specified by the end user.

c) The database for the completed job, including twisted-pair copper cabling links if applicable, shall be stored and delivered on USB flash drive. This USB flash drive shall include the software tools required to view, inspect, and print any selection of test reports.

d) Circuit IDs reported by the test instrument shall match the specified label ID.

e) A copy of the test results shall be provided that lists all the links that have been tested with the following summary information. The copy may be delivered on paper or electronically as specified by the end user.
   1) The identification of the link in accordance with the naming convention defined in the overall system documentation
   2) The overall Pass/Fail evaluation of the link-under-test
   3) The date and time the test results were saved in the memory of the tester

f) General Information to be provided in the electronic data base containing the test result information for each link:
   1) The identification of the customer site as specified by the end-user
   2) The overall Pass/Fail evaluation of the link-under-test
   3) The name of the standard selected to execute the stored test results

4) The value of the 'index of refraction' used for length calculations
5) The date and time the test results were saved in the memory of the tester
6) The brand name, model and serial number of the tester
7) The revision of the tester software and the revision of the test standards database in the tester

g) The detailed test results data to be provided in the electronic database for each tested optical fiber must contain the following information
1) The identification of the link/fiber in accordance with the naming convention defined in the overall system documentation
2) Tier 1:
(A) The insertion loss (attenuation) measured at each wavelength, the test limit calculated for the corresponding wavelength and the margin (difference between the measured attenuation and the test limit value).
(B) The link length shall be reported for each optical fiber for which the test limit was calculated based on the formulas above.
3) Tier 2:
i) All Tier 1 test results.
ii) The overall OTDR loss (attenuation) and length.
iii) The OTDR event loss at each wavelength and event location.
iv) The OTDR trace at each wavelength.
4) Tier 3:
i) All Tier 1 and 2 test results.
ii) A picture of the magnified connector endface.
iii) The pass status based upon visual inspection.

PART 2 PRODUCTS

A. Copper (Twisted Pair) Test Equipment
1. Category 6A Compliance
a) The test equipment (tester) shall comply with the accuracy requirements for level III field testers as defined in the TIA Cat 6A Document. The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy *plus* adapter contribution) are specified in Table B.2.10 of the TIA Cat 6A Standard.
b) The test plug shall fall within the values specified in E.3.2.2 Modular test plug NEXT loss requirements of the TIA Cat 6A Standard.
c) The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
d) The tester interface adapters must be of high quality and the cable shall not show any twisting or kinking resulting from coiling and storing of the tester

interface adapters. In order to deliver optimum accuracy, preference is given to a permanent link interface adapter for the tester that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface. The contractor shall provide proof that the interface has been calibrated within the period recommended by the vendor. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter cord cable shall not be of twisted-pair construction.

e) The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Part 3). Any Fail or Fail* result yields a Fail for the link-under-test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass or Pass*.

f) A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter. The test result of a parameter shall be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer must provide documentation as an aid to interpret results marked with asterisks.

2. Utilize the appropriate test equipment as manufactured by Datacom Technologies, Fluke, MicroTest, Scope, WaveTek, WireScope or approved equal. Print test results from the test unit used. Documentation shall include meter catalog number, serial number, manufacturer, cable identifier, Equipment Room/Telecommunications Room identifier, cable type, NVP settings, meter readings, test date, calibration information, and operator responsible for tests.

B. Fiber Optic Test Equipment

1. The test equipment shall be within the calibration period recommended by the manufacturer.
2. Fiber optic test jumpers and adapters shall be of high quality and shall not show excessive wear.
3. Optical Loss Test Set (OLTS)

a) An OLTS is comprised of two components: an optical light source and an optical power meter. After making a reference measurement, the source and meter are located at opposite ends of the fiber under test. A source and meter may be contained within the same package to enable bi-directional testing without swapping end test equipment.

b) Multimode optical fiber light source

1) Provide dual LED light sources with central wavelengths of 850nm (±30nm) and 1300nm (±20nm).
2) Output power of -20dB minimum.
3) Shall meet the requirements of ANSI/TIA/EIA-526-14A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50B, Method A. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap (as

described in clause 11 of ANSI/TIA/EIA-568-B.1) with a Category 1 light source.

c) Singlemode optical fiber light source
   1) Provide dual laser light sources with central wavelengths of 1310nm (±20nm) and 1550nm (±20nm).
   2) Output power of –10dB minimum.
   3) Shall meet the requirements of ANSI/EIA/TIA-526-7.

d) Power Meter
   1) Provide 850nm, 1300nm, 1310nm and 1500nm wavelength test capability
   2) Shall meet the requirements of ANSI/EIA/TIA-526-14A and ANSI/EIA/TIA-526-7.
   3) Power measurement uncertainty of ± 0.25 dB.
   4) Store reference power measurement.
   5) Save at least 100 results in internal memory.
   6) PC interface (serial or USB)

e) Optional requirements that lead to faster, more efficient testing
   1) Dual-wavelength single-adapter light source
   2) Dual-fiber automated testing
   3) Fiber length measurement using time-of-flight technology
   4) Automated loss budget calculation and pass/fail analysis

f) Optical Time Domain Reflectometer (OTDR)
   1) Shall have a bright, color transmissive LCD display with backlight.
   2) Shall have rechargeable Li-Ion battery for 8 hours of normal operation.
   3) Weight with battery and module of not more than 4.5lb and volume of not more 200in^3.
   4) Internal non-volatile memory and removable memory device with at least 16MB capacity for results storage.
   5) Serial and USB ports to transfer data to a PC.
   6) Multimode OTDR
      i) Wavelengths of 850nm (± 20nm) and 1300nm (± 20nm).
      ii) Event deadzones of 1m maximum at 850nm and 2m maximum at 1300nm.
      iii) Attenuation deadzones of 6m maximum at 850nm and 15m maximum at 1300nm.
      iv) Distance range at least 2000m.
      v) Dynamic range at least 10dB at 850nm and 1300nm.

g) Optional requirements
   1) Integrated OLTS
   2) Integrated optical power meter
   3) Integrated video microscope

4. Fiber Microscope
    a) Magnification of 250X or 400X for endface inspection
    b) Optional requirements
        1) Video camera and display showing magnified endface image
        2) Camera probe tips permitting inspection through adapters
        3) Capability to save image
    c) Standard of Quality Shall be Westover Scientific

PART 3 EXECUTION

3.1 GENERAL

A. All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.

B. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 COPPER (TWISTED PAIR) TESTING

A. General
1. Field-test instruments shall have the latest software and firmware installed.
2. Link test results from the Test Equipment shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.
3. Testing shall be performed on each cabling segment (panel to connector or connector to connector).
4. Testing of the cabling shall be performed using high-quality test cords of the same Category and manufacturer as the cabling under test.

B. Performance Test Parameters (Category 6A)
1. The test parameters for Cat 6A are defined in TIA Cat 6A standard, which refers to the ANSI/TIA/EIA-568B-2.10 standard. Test results shall at a minimum show alien attenuation crosstalk ratio far-end (AACRF), alien far-end crosstalk (AFEXT), alien near-end crosstalk (ANEXT), power sum alien attenuation crosstalk ratio far-end (PSAACRF), power sum alien far-end crosstalk (PSAFEXT), and power sum alien near-end crosstalk (PSANEXT).

3.3 OPTICAL FIBER CABLE TESTING

A. General
1. Field-test instruments shall have the latest software and firmware installed.
2. Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.

3. Fiber endfaces shall be inspected at 250X or 400X magnification. 250X magnification is suitable for inspecting multimode and singlemode fibers. 400X magnification may be used for detailed examination of singlemode fibers. Scratched, pitted or dirty connectors shall be diagnosed and corrected.
    a) It is preferable that the endface images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.
4. Testing shall be performed on each cabling segment (connector to connector).
5. Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use per the owner's instructions.
6. Testing of the cabling shall be performed using high-quality test cords of the same fiber type as the cabling under test. The test cords for OLTS testing shall be between 1 m and 5 m in length. The test cords for OTDR testing shall be approximately 100 m for the launch cable and at least 25 m for the receive cable.

B. Performance Test Parameters
1. Three tiers of certification are available that vary in thoroughness of infrastructure analysis.
    a) Tier 1: optical loss testing
    b) Tier 2: optical loss and OTDR testing
    c) Tier 3: optical loss and OTDR testing and magnified endface inspection
2. Tier 3 certification is recommended unless otherwise specified by the end-user.
3. Optical loss testing (Tiers 1, 2 and 3)
    a) Backbone link: The backbone link shall be tested bi-directionally at both operating wavelengths to account for attenuation deltas associated with wavelength. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation (Section C.3.iv) shall be used to determine limit (acceptance) values.
        1) Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with ANSI/EIA/TIA-526-14A, Method B, One Reference Jumper or the equivalent method.
        2) Singlemode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7, Method A.1, One Reference Jumper or the equivalent method.
        3) The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA/EIA standard 568-B
        4) Link Attenuation (dB) = Cable_Attn (dB)+ Connector_Attn (dB) + Splice_Attn (dB)
            i) Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)
            ii) Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
            iii) Maximum allowable connector_loss = 0.75 dB
            iv) Splice_Attn (dB) = number_of_splices (S) * splice_loss (dB)

v) Maximum allowable splice_loss = 0.3 dB
vi) The values for the Attenuation_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km))
Multimode 62.5/125 µm	850	3.5	1300	1.5
Multimode 50/125 µm	850	3.5	1300	1.5
Single-mode (Inside plant)	1310	1.0	1550	1.0
Single-mode (Outside plant)	1310	0.5	1550	0.5

5) Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
6) The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by ANSI/TIA/EIA-526-14A, Method B and ANSI/TIA/EIA-526-7, Method A.1; or the equivalent method. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.

b) Horizontal (multimode) link: The acceptable link attenuation for a multimode horizontal optical fiber cabling system is based on the maximum 90 m (295 ft) distance. The horizontal optical fiber cabling link segments need to be tested at only one (1) wavelength. Because of the short length of cabling, attenuation deltas due to wavelength are insignificant. The horizontal link should be tested at 850 nm *or* 1300 nm in one direction in accordance with ANSI/EIA/TIA-526-14A, Method B, One Reference Jumper method.
1) The horizontal link may be tested using a fixed upper limit for attenuation of 2.0 dB. This value is based on the loss of two (2) connector pairs, one pair at the telecommunications outlet/connector and one pair at the horizontal cross-connect, plus 90 m (295 ft) of optical fiber cable.
2) A horizontal link in an Open Office Cabling network with a consolidation point may be tested using a fixed upper limit for attenuation of 2.75 dB.

c) Centralized (multimode) link: The acceptable link attenuation for a multimode centralized optical fiber cabling system is based on the maximum 300 m (984 ft) distance. The centralized optical fiber cabling link segments need to be tested at only (1) wavelength. Because of the short length of cabling, attenuation deltas due to wavelength are insignificant.

The horizontal link should be tested at 850 nm *or* 1300 nm in one direction in accordance with ANSI/EIA/TIA-526-14A, Method B, One Reference Jumper method. Testing at 850 nm is recommended unless otherwise specified by the end user.

1) The centralized link may be tested using a fixed upper limit for attenuation of 3.3 dB. This value is based on the loss of three (3) connector pairs, one pair at the telecommunications outlet/connector, one pair at the consolidation point and one pair at the horizontal cross-connect, plus 300 m (984 ft) of optical fiber cable.
2) A horizontal link in an Open Office Cabling network with a consolidation point may be tested using a fixed upper limit for attenuation of 4.1 dB.

d) Optional requirements:

1) Each horizontal and centralized link shall be tested bi-directionally since the direction of the signal transmission often cannot be predicted at the time of installation. This is especially true for non-polarized connectors.
2) Each horizontal and centralized link shall be tested at both 850nm and 1300nm to confirm no attenuation differences due to wavelength even over short links.

4. OTDR Testing (Tiers 2 and 3).

a) Backbone, horizontal and centralized links shall be tested at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.

1) Backbone multimode: 850nm and 1300nm
2) Backbone singlemode: 1310nm and 1550nm
3) Horizontal multimode: 850nm or 1300nm
4) Centralized multimode: 850nm or 1300nm (850nm recommended unless otherwise specified by the end user)

b) Each fiber link and channel shall be tested in one direction.

c) A launch cable shall be installed between the OTDR and the first link connection. The launch cable shall be approximately 100m (328ft) in length and of the same fiber type as the link under test.

d) A receive cable shall be installed after the last link connection. The receive cable shall be at least 25m (82ft) in length and of the same fiber type as the link under test.

e) Reflective events (connections) exceeding 0.75 dB shall be identified, recorded and remedied to be less than 0.75 dB.

f) Non-reflective events exceeding 0.3 dB shall be identified recorded and remedied to be less than 0.3 dB. . Non-reflective events shall only be accepted for splices along the cabling. There shall be no losses acceptable for cable bends.

g) Optional requirements
   1) Bi-directional link testing.
   2) Segment attenuation coefficient if segment length > 1000m (3280ft). The segment attenuation coefficient shall not exceed 3.5 dB/km at 850nm and 1.5 dB at 1300 dB. Fibers exceeding these attenuation coefficients shall be replaced.

5. Magnified Endface Inspection (Tier 3)
   a) Fiber connections shall be visually inspected for endface quality. High loss and reflectance can result from improperly terminated, poorly polished or dirty connectors.
   b) Fibers shall be inspected at 250X or 400X magnification. 250X magnification is suitable for inspecting multimode and singlemode fibers. 400X magnification may be used for detailed examination of singlemode fibers.
   c) Scratched, pitted or dirty connectors shall be diagnosed and corrected.
   d) Optional requirements
      1) The endface image shall be saved and included in the test documentation package.
6. Length Measurement
   a) The length of each fiber shall be recorded.
   b) It is preferable that the optical length be measured using an OLTS or OTDR.
7. Polarity Testing
   a) Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with subclause 10.3 of ANSI/TIA/EIA-568-B.1. The polarity of the paired duplex fibers shall be verified using an OLTS.

C. Performance Test Parameters (OSP Cable)
1. Campus Backbone OSP Fiber Optic cable testing.
   a) Fiber optic cabling: Test all fiber optic cabling completely in accordance with ANSI/TIA/EIA-568-A, Annex H.
      1) All fibers shall be proof tested by the manufacturer at a minimum load of 6000 kPa. All fibers shall be 100 percent attenuation tested by the manufacturer for compliance with the specified performance requirements. Provide manufacturer's test results and performance certification before installation.
      2) Perform 100 percent attenuation test on all fiber optic cabling on the reel after receipt and before installation. Submit results to Owner for comparison against manufacturer's certified test results.

3) If any test results fail to meet the manufacturer's certified test results or are non-compliant with this Section, the cable shall be rejected.

4) Test and document all fiber optic cables from both ends on each terminated strand with a properly calibrated Optical Time Domain Reflectometer (OTDR) as manufactured by Siecor or approved equal. Documentation shall include OTDR catalog number, serial number, manufacturer, strand identifier, meter readings, test date, calibration information, and operator responsible for tests. All OTDR testing shall be fully compliant with ANSI/EIA/TIA-455-8.
5) Provide 100 meters of like fiber to project OTDR cable examination beyond the "dead zone."
6) Test and record all fiber losses and submit to Owner for approval. Provide all test information on printouts and on electronic files. Perform test as segments of the fiber installation are completed and as directed by the Owner

END OF SECTION

Revised 11/20/2019

COMMUNICATIONS COPPER HORIZONTAL CABLING

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. Supply and installation of a complete and working Horizontal Cabling Systems for
      a) Voice / Telephone
      b) Data / Network
         1) Including Data provisions for Other Systems (i.e. Video Surveillance, Access Control, Control Data, Intrusion Detection, etc.).
   2. System includes but is not limited to:
      a) Horizontal cabling.
      b) Station outlets including frames, connector modules, and cover plates.
      c) Patch panels

B. Related Sections
   1. All Division 27 Sections
   2. Common Work Results
      a) Division 27 – “Operation and Maintenance of Structured Cabling and Enclosures”
      b) Division 27 – “Basic Materials and Methods”
      c) Division 27 – “Grounding and Bonding for Communications Systems”
      d) Division 27 - “Pathways for Communications Systems”.
      e) Division 27 – “Firestopping for Communications Systems”
      f) Division 27 – “Identification for Communications Systems”
      g) Division 27 – “Commissioning of Structured Cabling”
   3. Interrelated Sections
      a) Division 27 – “Communications Cabinets, Racks, Frames and Enclosures”
      b) Division 27 – “Communications Cable Management and Ladder Rack”

C. Related Drawings
   1. Technology (T-Series) Drawings

1.3 REFERENCES

A. ANSI/TIA/EIA-568-C.0 – Generic Telecommunications Cabling for Customer Premisers.
B. ANSI/TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
C. ANSI/TIA/EIA-568-C.2 – Balanced Twisted Pair Telecommunications Cabling and Components Standard
D. ANSI/TIA/EIA-568-C.4 – Standard on Coaxial Cabling Components
E. ANSI/TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces.
F. ANSI/TIA/EIA-606-A – The Administrative Standard for the Telecommunications Infrastructure of Commercial Building.
G. "TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL" published by the Building Industry Consulting Services International (BISCI).

1.4 SYSTEM DESCRIPTION / DESCRIPTION OF WORK

A. The system shall be a 4 pair UTP copper Horizontal cabling system.
   1. Provide, test, and label all cables and terminations devices as described below and as shown on the plans.
   2. The system shall be an ANSI/TIA/EIA 568-B Category 6A compliant Unshielded Twisted Pair (UTP) horizontal cabling system.
   3. The Horizontal voice cabling systems shall be a Category 6A compliant system.
   4. The Horizontal data cabling system shall be a Category 6A compliant system.
   5. System shall meet or exceed the requirements for the PanGen System Warranty 25 year warranty and shall include the 25 year PanGen System Warranty. Contractor shall provide PanGen System Warranty documentation at project close out. **Or**,cabling manufacturer and/or contractor shall provide a total system warranty equal to or better than the PanGen System Warranty 25 year warranty. System Warranty documentation shall be provided to Owner Telecommunications department at project close out.
   6. See related Drawings for specific Project requirements.
   7. The system shall consist of total connectivity for a complete and permanent installed communications link.
   8. Refer to detail drawings for terminations standards and positioning of termination devices Provide, test, and label all cables and terminations devices as described below and as shown on the plans.
   9. The cable distance between the termination point with a Communications Room(s) and the station outlet(s) shall be no greater then 90 meters (295 ft).

10. The total channel distance shall not exceed 100 meters (328 feet) distance between equipment in the Communications room and station equipment, including all patch cables and station attachment cables
11. All system cables shall be continuous between points of termination, without splices.
12. All system cables shall be UL/NEC rated for the location, manner and site conditions in which the cables are installed. This includes, but is not limited to:
    a) Use of the cable rated for the application
    b) Not exceeding fill capacities of raceways
    c) All cable used shall be in compliance with Local, State, and Federal laws (at minimum the NFPA published "National Electric Code") as to acceptability for placement in the designed pathway. This includes, but is not limited to, cable fill capacities of raceways and plenum vs. non-plenum construction. **ONLY Plenum station cable shall be installed on the Indiana State University campus.** The Contractor shall provide and install the appropriate cable for the appropriate conditions.

1.5 SUBMITTALS

A. General
   1. Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.
   2. Samples shall be submitted with or immediately following submission of Product Data submittals.

B. Items to be submitted for approval prior to commencement of work:
   1. Product Data
      a) Manufacture datasheets for all cable
      b) Manufacture datasheets for all connectors
         1) Data sheets shall include
            i) Manufacturer name
            ii) Manufacturer model number (as it appears on manufacturer's product data sheet)
            iii) Manufacturer product description
            iv) Paragraph number of this section where the product is specified.
            v) Picture or Drawing of item

C. Quality Assurance / Control Submittals
   1. RCDD Certification for the staff member responsible for this project.
   2. Resume of the last 10 projects of the RCDD responsible for this project
   3. BICSI Technician's certificate for each lead Technician(s) on the project

D. Closeout Submittal
   1. Communication Room Rack Layouts, drawing to scaled, depicting devices and rack space occupied by each installed component.
   2. A diagram of the labeling scheme used on the Project.
   3. Additional closeout documentation as required in Division 1 and Division 27 “General Requirements for Communications”.
   4. Contractor shall provide PanGen System Warranty documentation at project close out. **Or**,cabling manufacturer and/or contractor shall provide a total system warranty equal to or better than the PanGen System Warranty 25 year warranty.

1.6 WARRANTY

A. Additional requirements: All cabling and connectivity products manufacturers, including patch cords, shall have in place an agreement recognizing each other for complete execution of warranty as specified. All performance and applications warranties shall be channel rated.
   1. The cable manufacturer and the connectivity products manufacturer shall have a partnership agreement established in order to provide the required warranty.
   2. Required warranty:
      a) The ANSI/TIA/EIA 568-B Proposed Category 6A compliant cable system shall include as a minimum a 25 year PanGen System Warranty. **Or**,cabling manufacturer and/or contractor shall provide a total system warranty equal to or better than the PanGen System Warranty 25 year warranty.

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

A. General
   1. This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.
   2. This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the Products section that are not required under the scope of this contract.
   3. Products required by the Drawings but not enumerated will be evaluated as a performance specification based on the information provided on the Drawings.

2.2 CABLES

A. General
   1. All cables on this Project shall be color-coded. ***See Detail drawings for color code.

2. CMP (OFNP) and CMR (OFNR) references below are as required by the NEC published by the National Fire Protection Association.
   a) Cables not specifically identified otherwise, shall be provided with CMP classification.
   b) Exceptions:
      1) Proper cable classification is ultimately determined by building construction; reductions in classification for cables, not clarified or altered by addendum to the specifications, shall require a contract cost deduction through a change order.

B. Twisted Pair Cables
   1. Electrical Requirements:
      a) All Twisted Pair cable is required to have the appropriate Category classification as defined by EIA/TIA/ANSI 568C. The compliance to these electrical characteristics must be third party verified by the manufacturer. Part 1 of this specification Section will define the appropriate Category for each cable.
      b) Recognized Categories:
         1) Category 1-2, Category 3, Category 5e, Category 6, Category 6A
         2) All requirements and testing parameters as set forth by EIA/TIA 568C.
   2. Construction
      a) All Twisted pair cable will be properly constructed for the environmental conditions and to meet all applicable codes.
      b) The following basic construction types are recognized for this Project:
         1) Premise Distribution 4 pair Cables - Category 6A
            i) Fully ANSI/EI/TIA 568C.1 Category 6A compliant
            ii) Cable shall have 2 individual insulated 24 AWG solid copper conductors formed into a twisted pair.
            iii) Cable must be constructed of four individually insulated Unshielded Twisted Pairs (UTP)
            iv) The cable construction must be available in plenum (CMP) and non-plenum riser (CMR) rated constructions.
            v) This cable construction is used in indoor pathways primarily as horizontal cabling but may also be used as backbone cable.
            vi) Standard of quality shall be as manufactured by Panduit Cable PUP6AM04BU-UG .
               (A) Additional approved manufacturer(s):
               (B) General Cable 7132849
               (C) CommScope 2091B BLU C6A 4/23 U/UTP W1000 | 760107201
               (D) Belden 10GXW13
               (E) Mohawk M59146

2.3 TERMINATION HARDWARE

A. General

1. Suggested layout of termination hardware is indicated on the Drawings. Contractor shall coordinate layout of termination hardware with the Owner's Representative before installation.
2. Provide one single manufacturer for all twisted-pair termination hardware used together in a permanent link or whenever a Category Certification is required.
3. Termination devices on this Project shall be color-coded. ****See Detail Drawings for details.
4. Terminate all UTP cabling utilizing the T568B wiring configuration.
5. The manufacturer of the cable and the manufacturer of the connectivity products shall have a partnership agreement established in order to provide the required warranty. See Warranty requirements above and in related Section 27 00 01.00. Contractor shall provide Owner warranty documentation at project close out.

   All devices shall be UL listed as required by the NEC published by the National Fire Protection Association.
6. All RJ-45 twisted pair termination devices are required to have the appropriate Category classification as defined by EIA/TIA/ANSI 568B. The compliance to these electrical characteristics must be third party verified by the manufacturer. Part 1 of this specification Section will define the appropriate Category for each cable.
   a) Recognized Categories:
      1) Category 1-2, Category 3, Category 5e, Category 6, Category 6A.
      2) All requirements and testing parameters as set forth by the latest update to EIA/TIA 568B.

B. Station Outlet

1. The following basic termination devices are available and recognized for this Project.
   a) Flush Faceplate – Single Gang
      1) Sloped faceplate Frame
      2) Four position minimum on each faceplate
      3) Electrical Ivory color unless otherwise specified
      4) May be mounted on an outlet box, bracket, or raceway.
      5) Must use module inserts below.
      6) Standard of quality shall be Panduit CFPSL4xxY
   b) Quad Jack Frame
      1) Four position minimum on each frame
      2) Electrical Ivory color unless otherwise specified
      3) May be mounted on an outlet box, bracket, or raceway.
      4) Will require a faceplate with standard duplex electrical outlet cut-out
      5) Standard of quality shall be Panduit CFG4xx

c) Faceplate Blank Insert
   1) Provide blanks for all un-used positions in faceplates, surface boxes, or jack frames.
   2) Color to match outlet faceplate as described above; Electrical Ivory color unless otherwise specified
   3) Standard of quality shall be Panduit CMBxx-X

d) Wall-Phone Jack
   1) Stainless Steel faceplate with mounting posts for keyhole slot telephone mounting
   2) May be mounted on an outlet box, bracket, or raceway.
   3) Standard of quality shall be Panduit KWP6PY.

e) Category 6A jack insert RJ-45
   1) Fully compliant ANSI/TIA/EIA 568B Category 6A RJ45 modular jack.
   2) Color shall be Blue for all locations identified as being voice locations. Color shall be Electrical Ivory for all locations identified as data locations. Coordinate with Owner's Representative or Architect/Engineer.
   3) Standard of quality shall be Panduit CJ6X88TGxx

C. Communications Room Equipment Rack(s)
   1. The following basic termination devices are available and recognized for this Project.
      a) UTP Cat 6A Patch Panel 24 port
         1) Panel shall be black steel with PCB connection between interfaces
         2) Shall provide 24 ports in 1.75" of rack space (1 RU).
         3) Must have labeling areas on front and rear
         4) Fully compliant ANSI/TIA/EIA 568B Category 6A
         5) RJ45 jack interface on front and 110 style IDC connections on rear
         6) Mountable in EIA standard 19" rack/cabinet rails.
         7) Standard of quality shall be Panduit CPPL24WBLY 24-Port Modular Patch Panel with Labels fully loaded with Panduit CJ6X88TGBL Category 6A Jack Modules.

PART 3 EXECUTION

3.1 GENERAL

A. This section is designed to provide the vendor with a standard of quality and functionality for the installation of technology systems infrastructure. Not all procedures will be necessary for the installation of this Project. However, this standard will be considered in force for the original response as well as for any additions or changes to this Project.

3.2 INSTALLATION

A. Coordination
   1. Review and coordinate proper pathways prior to installation.

B. General
   1. Cable routing shall follow building structure lines and shall be installed with adequate length to reach to any location within the equipment racks with at least 5 feet of service loop at each end.
   2. At point of final terminations, excess cable and the service loop shall be stored and dressed neatly.
      a) At the station end of the cable the service loop shall be stored above the ceiling line at an accessible point and support with an approved device designed for that purpose.
      b) Within a Communications Room the service loop shall dressed and stored within the ladder rack.
   3. Strain relief techniques shall be applied to all cables to lessen the risk of physical cable damage and to provide proper aesthetic value.
   4. Route all cabling and pathways parallel to building surfaces and at 90 degrees angles to the rafters and trusses.
   5. Cable runs shall be continuous and without splices.
   6. Wiring shall be free from grounds, shorts, opens, and reversals. Strain relief shall be provided at all connection points.

C. Protection
   1. Maintain protection of all cabling throughout the entire duration of the project. Cabling shall not be left hanging or coiled where it potentially obstructs the Work of other trades. Cabling shall be bundled, supported, and protected up out of the way of other trades any time it is determined necessary to ensure the safety or personnel and protection of the cable.
   2. Do not terminate cables designated for different services onto the same patch panel unless otherwise clearly indicated on the drawings. Coordinate with Owner before any terminations are made.
   3. No not exceed minimum bend radius or pulling tension specifications set forth by the product manufacturer.
   4. Cable Separation and Organization
      a) Horizontal cables of all service types (i.e. Voice, Data, Control, RF, etc….) shall be organized and kept segregated within cable trays, ladder rack, wire management and other pathways to the degree physically possible.
      b) Cables of different services shall not be intertwined.
      c) Terminate all cabling on specified termination hardware in numerical order and on specified outlets.

D. Labeling
   1. Every cable shall have a label applied to the jacket at each end.
   2. Each terminating device and port shall have a unique identifier.
   3. Label all cabling and terminations as specified and indicated on related drawings.

E. Use of Raceways
   1. Install cabling within conduit and in surface raceway where specified in this or related sections and as indicated on the drawings.
   2. Cabling shall be installed in a concealed manner. Cables may be visible only in the following areas;
      a) Equipment Rooms
      b) Telecommunications Rooms
      c) Building spaces equipped with cable trays, but without finished ceilings to conceal the cables.
   3. Install cabling in Cable Tray / and Ladder rack where specified and/or indicated on the drawings.
   4. Support cables using approved products and methods whenever conduit, surface raceway and cable tray are not specified. Cable supports shall be attached directly to building structure.

F. Cabling on backboards and in Equipment racks
   1. Neatly dress, support, and securely attach all cabling.

G. Termination
   1. Terminate each end of every cable provided.
   2. Terminate all UTP cabling utilizing the T568B wiring configuration.
   3. Terminate each cable from a station outlet in numerical order on adjacent ports on the specified termination hardware within the appropriate Communications Room.
   4. Terminate cables using the tools and connectors specified and as recommended by the cable/connector manufacturer.

H. Separation from Sources of Interference
   1. Route cables at least 1.2m (4 foot) from motors or transformers; 30 cm (1 foot) from conduit and cables used for AC power distribution; 12 cm (5 inches) from fluorescent lighting fixtures.

I. Cable Supports
   1. Where cabling is not supported by cable tray or conduit, provide necessary cable support as specified. Provide nylon cable tie at the support to contain cabling within the support. Do not bundle cable between supports. Provide cable support as specified at intervals not to exceed 5 feet. Do not secure cabling to the support. Do not use cable supports with round surfaces (i.e. bridal rings).

J. Horizontal cabling
   1. The length of patch cords and cross connect jumpers installed in the Telecommunications Room shall be 5 m (15 ft) total or less.
   2. The length of patch cords and cross connect jumpers installed in the Equipment Room shall be 5 m (15 ft) total or less.
   3. Locate telecommunications outlets so that the cable assembly required to reach work area equipment will be no more than 5 m (15 ft) long.
   4. Provide service loops on all cables at the station end of 2 feet (coiled above the ceiling and with a minimum of 6 inches at the telecommunications outlet coiled in the box or raceway.
   5. Provide service loop at the Equipment Room/Telecommunications Room end of 5 feet coiled above the ceiling or neatly bundled in ladder rack above the cabinet/rack.
   6. Install telecommunications outlets securely at work area locations.
   7. Any necessary electrical components (e.g., impedance-matching devices) at outlets shall be located outside the faceplate via a standard plug connection.
   8. Provide surface raceway on all walls where existing pathway has not been provided and cables cannot be concealed inside the wall cavity. Do not conceal cabling inside of block walls. Install surface raceway "level" straight and securely anchored to walls with screws, bolts, or anchors as appropriate.
   9. Provide a 6 inch service loop on each horizontal UTP cable that breaks out from the harness for termination and do not violate the minimum bend radius of the cable.

3.3 TESTING

A. All cables shall be fully tested and verified compliant with these specifications.
   1. See: "Commissioning of Structured Cabling" for UTP Horizontal performance testing parameters and procedures.

B. The Owner reserves the right to have a representative present during any or all testing procedures. Verification testing of copper and fiber will be performed at or near Project completion by the Consultant for quality assurance.

C. Upon verification testing, if the Consultant finds the test results do not match the Contractor's results, the Consultant or a third party may at the Owner's request retest all of the cabling and submit those results to the Owner and deduct the verification testing costs from the Contractor's Contract amount.

END OF SECTION 27 15 13.00

Revised 11/18/2019

COMMUNICATIONS CONNECTING CORDS, DEVICES, AND ADAPTERS

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. Supplementary to Division 1, Refer to Division 27 Section(s) for additive information where applicable.

1.2 SUMMARY

A. Section Includes:
   1. Cable Assemblies, Devices, and Adapters for Communications
      a) Voice / Telephone
      b) Data / Network
   2. General requirements are as follows:
      a) Provide cable assemblies and devices with electrical/optical properties to match the designed infrastructure.
   3. Special requirements are as noted on Drawings.
   4. All Work shall fully comply with these specifications and related Drawings and all manufacturers recommended installation practices.

B. Products Supplied But Not Installed Under This Section
   1. None

C. Products Installed But Not Supplied Under This Section
   1. None

D. Related Sections
   1. All Division 27 Sections

E. Related Drawings
   1. Technology (T-Series) Drawings

1.3 SYSTEM DESCRIPTION

A. Provide the following cable assemblies (cords), Devices, and adapters: **(only provide if specifically requested by Owner)**
   1. Telephone Patch Cables
      a) Category 6A cables, 3-5 feet in length as required for the Equipment Room/Telecommunications Room end.
      b) Confirm Color for telephone cables

c) Labeled with the same unique identifier at both ends of the assembly.
d) Provide a quantity of 1 for each horizontal telephone cable installed.

B. Labels:
1. Provide alphanumeric, clearly typewritten labels at all designated points as follows:
2. See Detail Drawings for graphical representation of labeling scheme.

1.4 SUBMITTALS

A. General
1. Product Data and Shop Drawing submittals for work of this section shall be SUBMITTED TOGETHER, complete, as a single submittal. Product Data and Shop Drawings are not to be submitted separately.
2. Samples shall be submitted with or immediately following submission of Product Data submittals.

B. Items to be submitted for approval prior to commencement of work:
1. Product Data
a) Manufacture datasheets for all cable assemblies
b) Manufacture datasheets for all devices
c) Manufacture datasheets for all adapters
1) Data sheets shall include
i) Manufacturer name
ii) Manufacturer model number (as it appears on manufacturer's product data sheet)
iii) Manufacturer product description
iv) Paragraph number of this section where the product is specified.
v) Picture or Drawing of item

C. Closeout Submittal
1. Cable color code utilized for patching.
2. Labeling scheme utilized for cable assemblies.

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

A. General
1. As required in Division 27 Section 27 00 01 "General Requirements for Communications"
2. This section is designed to provide the Contractor with a minimum standard of quality and functionality for the products used for telecommunications infrastructure.
3. This standard will be considered in force for the original response as well as for any additions or changes to this Project. Due to this, there may be items listed in the Products section that are not required under the scope of this contract.

4. Products required by the Drawings but not listed in Part 2, will be evaluated as a performance specification based on the information provided on the Drawings.

2.2 CABLES

A. Copper Cable Assemblies (Twisted Pair)

1. Category 6A Copper patch cables

a) Copper patch cables shall be ANSI/TIA/EIA 568A Proposed Category 6A compliant with eight position RJ45 modular plugs on each end. Use T568B wiring. Apply an identifying label to each end of the cable assembly (same identifier on each end of the cable and a unique identifier for each patch cable on the Project regardless of installed location).

b) Color Coding:

1) Critical Building Systems Red
2) Voice Over IP Orange
3) Classroom Black
4) Administrative Yellow
5) Cross-Over connections Blue
6) Straight-Through uplinks Green
7) Network Management Purple
8) IP Video White
9) Work Area (Attachment) Gray

c) UTP Cable Assemblies Category 6A, coordinate with Owner prior to purchasing cables. In most cases data patch cables will be six inch.

1) Standard of quality shall be Panduit
   i) 6 inch with labels added
   ii) 3 foot with labels added
   iii) 5 foot with labels added
   iv) 7 foot with labels added
   v) 10 foot with labels added
   vi) 14 foot with labels added
   vii) 20 foot with labels added
2) Additional Approved Manufacturers:

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. This section is designed to provide the vendor with a standard of quality and functionality for the installation of technology systems infrastructure. Not all procedures will be necessary for the installation of this Project. However, this standard will be considered in force for the original response as well as for any additions or changes to this Project.

3.2 INSTALLATION PRACTICES

A. Standards: The minimum criteria for proper installation can be found in the *TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL* published by the Building Industry Consulting Services International. The vendor must refer to this publication for cable installation practices. This Specification may take exception to optional statements within this manual. Treat any conflict per this Specification under discrepancies or Conflicts.

B. The following items should be considered to be minimum standards for this Project:

1. The vendor is responsible for receiving, handling, storing, and protecting all materials used on this Project until the Project is signed as complete.

C. General Requirements:

1. Throughout the entire installation the Contractor must maintain complete protection of all cabling. Cabling shall not be left hanging or coiled where it potentially obstructs the Work of other trades. Cabling shall be bundled, supported, and protected up out of the way of other trades any time it is determined by the Architect/Engineer to be necessary.

3.3 LABELING

A. Provide labeling as specified in Part I.

B. Label all items listed in quantities required by the drawings and specifications.

C. Apply all labels straight and legible.

END OF SECTION 27 16 00.00

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. Division 28 Specifications and Drawings.

1.02 SUMMARY

A. Basic materials, methods and installation guidelines applicable to the work of all Division 28 documents.

B. The information included in this Section apply too and are additional requirements for all of Division 28 documents.

C. Thoroughly review entire bid documents, including all drawings and specifications prior to bidding and include all indicated work in bid.

1.03 REQUIREMENTS

A. Project Coordination

1. Commence coordination immediately upon award of contract. Coordination includes providing and extracting related information to and from other trades for review. Failure to coordinate in a timely manner shall not result in any subsequent additional reimbursement, special allowances or additional construction time being made for any facet of the project. Work fabricated or installed before properly coordinating with all other trades shall be done at the Contractor's own risk.

2. Work in harmony with all building trades, so as not to cause any delays. Sequence, coordinate, and integrate installations of communications materials and equipment with all other applicable trades for efficient flow of the Work. In addition, contact and coordinate/facilitate work of local communications service providers for incoming communications services. Execute connections with local services providers complete as indicated.

3. The drawings indicate the approximate location and arrangement of required work. The drawings shall be followed as closely as possible in coordination and in execution of the work.

4. Participate in coordination efforts and in preparation of coordination drawings prior to fabrication or installation of any equipment, materials, etc. Coordinate actual clearances of all installed equipment.

5. Conflicts in equipment and materials shall be corrected prior to installation. Should there be a conflict with the drawings of other trades, work with the trades to correct the conflict while coordinating the project. If the conflict cannot be resolved, refer the matter to the owner's representative for a final decision as to method or material. Refer to drawings of all other trades for details, dimensions and locations of other work and route their work so as not to conflict with any other branch. Any work installed or equipment placed in position by this contractor creating a conflict shall be readjusted to the satisfaction of the Owner's representative at the expense of this contractor.

6. All products furnished of a given type shall be by a single manufacturer; shall bear the same brand name; shall be of the same finish color and texture; and shall be from the same product model series, unless otherwise noted.

7. Plans are diagrammatic indicating design intent and indicating required size, points of termination and, in some cases, suggested routes of raceways, etc. However, it is not intended that drawings indicate fully coordinated conduit routing, all necessary offsets, etc. Provide all cable assemblies, etc. as straight as possible and symmetrical (perpendicular to or parallel

with) with architectural items and in a consistent elevation. Do not provide work installed diagonal to building members.

B. Shop Drawings, Product Data, and Samples

1. All submittals shall be submitted electronically in PDF format unless otherwise directed by the A/E or Owner.
2. Provide complete master material list.
3. Provide the following information for each product:
   a. The manufacturer's name (Brand) and full model number.
   b. Product Information Sheets "Datasheets": Include catalog information, sizing, and technical data on each item to be used on the Project.
   c. Each product datasheet must reference the specific paragraph for which the product is being submitted. Each product must be listed in the exact same order as it appears in the Section for which the products are being submitted.
   d. Datasheets shall each include a clearly identifiable label applied in upper corner of each sheet that clearly references the specification section and drawing (as applicable) to which it applies. Labels shall be consistently affixed in the same location on all sheets unless the labels will obstruct pertinent technical information.
4. All datasheets shall be original manufacture datasheets.
5. Where datasheets depict multiple products, versions or options, the Contractor shall highlight (indicate with an arrow) all applicable model(s), version(s) and option(s) applying to the specific product the Contactor will be providing. Exact catalog number must be indicated. The submitted items must be from "approved materials" as specified in each Specification Section.
6. Do not combine with submittals from any other Division.

C. Operation and Maintenance Manuals

a. Prepare Operations and Maintenance Manuals in accordance with Section 01 77 00 Contract Closeout.
b. Operations and Maintenance (O&M) manuals shall be provided for each item of equipment. Flash drives shall be file folder indexed for each piece of equipment. O&M submittals shall include but not be limited to the following:
   a. Installation instructions and schematic drawings.
   b. Operating and maintenance instructions.
   c. Complete parts list with manufacturer's model numbers.
   d. Complete set of approved shop drawings.
   e. Complete wiring diagrams showing all connections and internal wiring diagrams of all equipment, including module diagrams. Factory typical wiring diagrams are not acceptable.

D. Building Codes:

1. National Electrical Code (NFPA 70)
2. Life Safety Code (NFPA 101)
3. Uniform Building Code (Or adopted State Code)
4. Federal Communications Commission (FCC) Part 68
5. State specific agencies:
   a. Administrative Building Council
   b. State Board of Health
   c. State Fire Marshal

d. Local Codes (City, County, etc.)

e. Local Utility Company requirements

E. Standards

1. American National Standards Institute/Telecommunications Industry Association – ANSI/TIA 568C Commercial Building Telecommunications Cabling Standard.
2. American National Standards Institute/Telecommunications Industry Association – ANSI/TIA 569D Commercial Building Standard for Telecommunications Pathways and spaces.
3. American National Standards Institute/Telecommunications Industry Association – ANSI/TIA 606B The Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.
4. American National Standards Institute/Telecommunications Industry Association – ANSI/TIA 607C Commercial Building Grounding and Bonding Requirements for Telecommunications.
5. American National Standards Institute /Building Industry Consulting Services International – ANSI/BICSI 005-2016, Electronic Safety and Security (ESS) System Design and Implementation Best Practices.
6. ASIS – Security Management Standard: Physical Asset Protection (PAP)
7. ASIS – Facilities Physical Security Measures Guideline (FPSM)

F. Permits

1. Contractor shall obtain and pay for all permits or certificates of inspection and approval required for his branch of the work.
2. Permits shall be posted in a prominent place at the building site properly protected from weather and physical damage.

G. Definitions

1. Wherever the word “Install” appears on the drawings or in these Division 28 specifications it shall mean to supply all labor, tools and incidental materials necessary to handle, store, mount, terminate, program, configure and adjust product as necessary to fulfill project requirements.
2. Wherever the word "Provide" appears on plan drawings or in Division 28 specifications, it shall be interpreted to mean that the Contractor shall "Furnish and Install", including all necessary accessories, miscellaneous materials and labor necessary to render the respective system fully operational.
3. Wherever the word "Work" appears in Division 28 specifications or on communication technology drawings, it shall be interpreted to mean any and all labor, materials, accessories, services, etc. necessary to fulfill project requirements.
4. Wherever the word “Furnish” appears on the drawings or in these Division 28 specifications it shall mean to supply the specified labor or specified product, including all associated shipping, storage and warranty expenses.
5. Wherever the words “Site”, “Project Site”, or “Premises” appears in Division 28 specifications or its related drawings, it shall be interpreted to mean all real estate, buildings and structures where work will be performed and where products will be installed and reside.
6. Wherever the phrase “Standard of Quality” appears in Division 28 specifications or its related drawings, the Contractor shall interpret this to mean that the listed Manufacturer and Catalog number for each item has the physical, functional, and operational attributes to provide the designed functionality.

H. Quality Assurance

1. Contractor shall have a minimum five (5) years of experience in the installation of Communication Technology system(s) of similar size, type, scope and contract value.
2. The lead technician(s) on the Project shall have a thorough understanding of the following:
   a. American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 568B Commercial Building Telecommunications Cabling Standard.
   b. American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 569A Commercial Building Standard for Telecommunications Pathways and spaces.
   c. American National Standards Institute/Telecommunications Industry Association – ANSI/TIA/EIA 606 The Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.
   d. American National Standards Institute/Telecommunications Industry Association/Electronics Industry Association – ANSI/TIA/EIA 607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
   e. American National Standards Institute /Building Industry Consulting Services International – ANSI/BICSI 005-2016, Electronic Safety and Security (ESS) System Design and Implementation Best Practices
   f. ASIS – Security Management Standard: Physical Asset Protection (PAP)
   g. ASIS – Facilities Physical Security Measures Guideline (FPSM)
3. Contractor shall be a (factory trained) certified installer for all systems provided in Division 28.
   a. This minimum requirement shall apply to each Division 28 section independently. If Contractor is incapable of meeting the percent of product value requirement for each section, Contractor shall use a Subcontractor that can meet the percent of product value requirement, in whole, for all products and work of that section for which This Contractor is not qualified.
   b. The specific Contractor or Subcontractor meeting the requirements for a specific section shall be responsible for the supply of the products, supplemental engineering services and submittals as well as performing all technical labor associated with the installation, training and warranty servicing of work of that section.
4. Contractor shall have substantial business operations located within a 100-mile radius of the project site with a full-time employee staff actively engaged in the supply, installation and service of systems and equipment of the type and scope herein specified.
5. Contractor shall have full-time employee service staff based within a 100-mile radius of the project site.
6. Contractor shall provide any additional information requested by the Owner as determined appropriate by the Owner to validate a Contractor’s (or its Subcontractor’s) ability to perform and warranty the specified work in the quality, manner and time frame required.
7. Superintendent/Project Manager
   a. This Contractor shall furnish the services of an experienced superintendent/Project Manager who shall be constantly in charge of the work, together with the qualified Foremen and specialists as required to properly install, connect, adjust, start, operate and test the work involved.
   b. The superintendent's/Project Manager’s qualifications shall be subject to the review and acceptance by the A/E and Owner. Unless the A/E or Owner grants prior special permission, the same communication Superintendent/Project Manager shall be utilized throughout the duration of the project and be responsible for the complete scope of the Contract.

I. Product Delivery Requirements

1. The Contractor shall not procure, deliver or install any product until after the contractor's submittal has been reviewed by the A/E and Owner and the submittal has been returned to the Contractor's marked "Reviewed No Exceptions Taken", "Reviewed as Noted" or "Rejected Resubmit". Advance procurement, delivery or installation of product prior to the return of submittal is entirely at the Contractor's own risk. Contractor should schedule its work and procurement accordingly.
2. Prior to procurement of any equipment or materials, Contractor shall review the model numbers, compatibility and interoperability of all products.
3. Prior to procurement, Contractor shall, through coordination with other trades and through field measurements and project site inspections, verify that products to be supplied can be physically installed as planned.
4. No claim for additional payment will be considered for the return of any equipment determined incompatible, or procured without adhering to the aforementioned conditions, including claim for reimbursement of manufacturer's "restock" fees.
5. Contractor shall factor all of these conditions into its bid and plan its scheduling and resource needs accordingly to ensure that all work shall be performed according to the Owner's schedule and requirements of this Contract.

J. Product Storage and Handling Requirements

1. The Contractor is responsible for receiving, handling, storing, and protecting all materials used on this Project until Substantial Completion.
2. Pack components in factory-fabricated protective containers.
3. Units shall be delivered in sections of such size as will pass through available openings.
4. Until ready for installation, store products in original factory containers.
5. Products shall be stored in a clean, dry space and as additionally recommended by the product manufacturer.
6. Keep products out of the weather and away from construction traffic and debris, including drywall finish dust.
7. Do not exceed structural capacity of the floor or platform on which the products are stored.
8. Until final acceptance of the system, protect all supplied products from damage resulting from moisture, fumes, dirt, dust and debris or any other source of potential damage.
9. Handle all products with care before, during and after installation so as to prevent damage.
10. Replace any products damaged prior to final acceptance with new replacement products.
11. Replacement shall be at Contractor's expense.
12. Contractor is responsible for the safety and good condition of the materials and equipment installed until final acceptance by the Owner.
13. Save original product shipping containers and related packaging materials for major products until final acceptance.
14. Prior to disposal, check with owner to determine if the owner wishes any of the packaging materials.

K. Examination and Preparation

1. Contractor shall visit the Site to familiarize himself with the local conditions under which the work is to be performed and correlate his observations with the requirements of the Contract

Documents. No allowance shall be made for claims for concealed conditions which the Contractor, in exercise or reasonable diligence in observations of the Site and review of the local conditions under which the work is to be performed, learned or should have learned of, unless otherwise specifically agreed by A/E and Owner in writing.

2. Before ordering any materials or doing any work, the Contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement or size indicated in the drawings or specifications. Any discrepancies found shall be submitted in writing to the A/E and Owner for consideration before proceeding with the work.
3. This Contractor must verify all dimensions locating the work and its relation to existing work, all existing conditions and their relation to the work and all man made obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the Contract Documents.

L. Installation

1. Provide all required labor, materials, equipment and Contractor's services necessary for complete installation of systems required to comply with the requirements of authorities having jurisdiction, as indicated on Drawings, and as specified.
2. Work shall be functional and complete in every detail, including any and all items required to complete the system, whether or not these items have been enumerated or shown on the Drawings.
3. Special attention shall be given to access to working and controlling parts. Adjustable parts shall be within easy reach. Removable parts shall have space for removal.
4. Each Contractor shall be fully knowledgeable of the details of all Work to be performed by other trades and take necessary steps to integrate and coordinate his Work with other trades.
5. Wherever tables or schedules show quantities of materials, they shall not be used as a final count. These figures serve only as a guide for the Contractor. Each Contractor shall be responsible for furnishing all materials on the Drawings or as specified.
6. The Consultant and Owner's Representative have full power to condemn or reject any Work, materials or equipment not in accordance with these Specifications and Construction Drawings or the manufacturer's specifications or drawings approved by the Owner or Consultant.
7. Work or equipment that is rejected shall be removed and replaced to the satisfaction of the A/E and Owner at the Contractor's expense. Work or equipment that is rejected shall be so stated in writing by the A/E or Owner.
8. Such decisions that the A/E or Owner may make with respect to questions concerning the quality, fitness of materials, equipment, and workmanship shall be binding upon the parties thereto.
9. All Work shall fully comply with these specifications and related Drawings and all manufacturers recommended installation practices.
10. All Work shall be performed with the best practices of the trade for performance, functionality, safety, endurance, and aesthetics.
11. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.
12. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible, as appropriate to the application.

13. Set all equipment to accurate line and grade, level all equipment and align all equipment components.
14. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.
15. No equipment shall be hidden or covered up prior to inspection by the owner's representative. All work that is determined to be unsatisfactory shall be corrected immediately.
16. All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.
17. Install all equipment and materials in strict accordance with manufacturer's written instructions. Bring any conflicts between the manufacturer's written instructions and these specifications to the attention of the A/E for recommendations.
18. Upon completion of installation of equipment and communication circuitry, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with re-testing.

M. Cutting and Patching

1. Where demolition of existing surfaces are required by the Work, the same shall be restored to at least as good a condition as they were before.
2. Contractor shall be responsible for painting, patching, repairing and replacing any building surface, furnishing, wall/floor/ceiling covering that is damaged or penetrated in the process of performing work on the project site.
3. Additional work required to repair work performed under this Contract shall be at the expense of This Contractor.
4. The Division 28 contractor shall do all cutting as required for the admission of Division 28 work. Unless directed otherwise in field, provide all related patching and painting to match surrounding methods, materials and colors. Any damage done by this contractor to the building during the progress of this contractor's work shall be made good at this contractor's expense.

N. Site Maintenance

1. During the progress of the work, the Contractor shall clean and leave the premises and all portions of the building in a clean and safe condition. This cleaning shall occur on a daily basis.

O. Final Cleaning

1. Clean all parts of the apparatus and equipment. Exposed parts, which are to be painted, shall be cleaned of cement, plaster and other materials and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all corners and cracks scraped out.

P. Closeout Requirements

1. Upon the Designer's receipt of and approval of the Contractor's pre-test submittal, the Contractor shall contract the Designer to schedule acceptance testing. Contractor shall allow not less than 10-business days of advance notice to the Owner.
2. In the presence of the Owner, the Contractor shall demonstrate the presence of all specified products, cabling and installation methods. The Contractor shall demonstrate the operation of the system (and any requested sub-component thereof) and shall be prepared to make any electronic, physical or software related adjustments to the system or any of its sub-components to the satisfaction of the Owner, as required to achieve full compliance with the specifications.

3. The contactor shall have available at the project site all test equipment, cables, tools and personnel necessary to demonstrate full compliance with these specifications as determined necessary by the designer.
4. During the acceptance testing the Contractor shall have a clean and fresh copy of the contractor's most up to date as-built record documentation, printed to scale.
5. This Contractor shall provide all required labor services required to completely verify and test the systems in the presence of the Owner.
6. Verify that each system, as a whole system, meets these Specifications and complies with all applicable standards.
7. Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense.

Q. Warranties

1. Specified materials and workmanship provided shall be fully guaranteed by the Contractor for one year from the transfer of title via notice of substantial completion against any defects in materials or workmanship.
2. Extended (additional) warranty(s) may be required and will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.
3. Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Warranty by the Contractor but may exceed the Contractor's Warranty Period.
4. Manufacturer's Warranties shall also begin upon Substantial Completion.
5. The Warranty shall begin upon Substantial Completion.
6. This warranty shall in no manner cover equipment that has been damaged or rendered unserviceable due to negligence, misuse, acts of vandalism, or tampering by the Owner or anyone other than employees or agents of the Contractor.
7. The Contractor's obligation under its warranty is limited to the cost of repair of the warranted item or replacement thereof, at the Contractor's option.
8. Insurance covering said equipment from damage or loss is to be borne by the Contractor until full acceptance of equipment and services.
9. Individual specification sections may have additional warranty requirements for the work in that section. The warranty above will cover all materials and work where not covered by an extended warranty listed in the individual specification section.
10. Specified materials and workmanship provided shall be fully guaranteed by the Contractor against any defects in materials or workmanship.
11. Contractor shall provide a full "System Warranty" which shall cover all materials, labor and related product shipping expenses for a period of five years from the date of Owner acceptance.
12. Supplied products with manufacturer's warranties of less than the System Warranty term shall be extended by the Contractor for the full specified term.
13. During this period the Contractor will remedy (at no cost to the owner) any problem with the system, or any of its related components that is the result of defective materials, settings, workmanship, or loss or programming.
14. Any defective items or work shall be removed and replaced at the Contractor's expense to the satisfaction of the owner's representative and the Owner.

15. The period of the Contractor warranty(s) for any items herein are not exclusive remedies, and the Owner has recourse to any warranties of additional Scope given by the Contractor to the Owner and all other remedies available by law or in equity.
16. Additional Warranty requirements may be added by an individual Specification Section.
17. Scope of these extended (additional) warranty(s) will be identified in the individual Specification Section and will be considered additive to this base Contractor Warranty.
18. Requirements for Manufacturer's Warranties, required by a Specification Section, shall run concurrent to this base Contractor Warranty by the Contractor.
19. Manufacturer's Warranties shall also begin on Substantial Completion.

R. Demonstration and Training

1. Each Division 28 section may specify special Training requirements.
2. Training requirements will be for a quantity of hours, allow for multiple trips.
3. If no special requirements are specified in the individual section, provide for 4 hours and 2 trips for basic overview, operation and maintenance information per section.
4. Train Owner's maintenance personnel on the procedures and schedules involved in operating, general troubleshooting, and preventative maintenance of the system.
5. Contractor shall require all attendees to sign-in for each training session. The sign-in form shall summarize the training to be conducted, specification section and subsection being trained on, as well as the starting time and duration of training. Following training, a representative of the owner shall sign the form, acknowledging the same. Contractor shall retain the original copy of these forms and turn over a photo copy of the form to the owner's representative as evidence of training. Training conducted without this official record of training shall not be considered as part of the Contractor's training obligation.
6. Schedule training with the Owner's representative, at least 14 days in advance.

PART 2 - PRODUCTS

2.01 ASSIGNMENT OF MISCELLANEOUS WORK

A. Excavating and backfilling for telecommunications work shall be by telecommunications contractor.

1. Properly support banks of excavation with safety sheet pile. Install necessary guards. Provide adequate pumping equipment and keep excavation free of water.
2. Excavate pipe trenches to proper depth. Where rock is encountered, excavate to 6 inches below pipe and refill to 6 inches above pipe with compacted granular fill. Granular fill shall consist of dune sand, gravel or other suitable material containing not more than 10 percent by weight passing #200 sieve and 100 percent passing 1-inch sieve.
3. Excavation for utilities shall not be backfilled until all required tests are performed and approved by Engineer and the utility company.
4. Whenever underground feeders are run below footings and grade beams, contractor shall backfill the void with poured, steel-reinforced concrete to elevation of bottom of footing or grade beam. Backfill within building lines shall be made with granular fill or compacted backfill material laid in 6-inch layers and tamped to specified compaction after each layer.
5. Backfill under paved area shall be made with granular fill compacted backfill material laid in 12-inch layers and tamped to compaction after each layer.
6. Backfill under open yards or fields shall be made with non-compacted backfill laid in layers not to exceed 24 inches deep. Sand trenches may be allowed to settle naturally and shall be refilled back to grade as required during first year after final acceptance.

7. Contractor shall refill, regrade and refinish any area that becomes unsatisfactory due to settlement within one year after final acceptance.
8. Contractor shall verify all existing grades, inverts, utilities, obstacles and topographical conditions prior to any trenching, excavation or underground installation. In event existing conditions are such as to prevent installation in accordance with Drawings, contractor shall immediately notify Engineer.
9. Provide appropriate plastic marker tape buried directly above underground electric and communication lines continuously along length of lines. Marker tape shall be located 12 inches below finished grade, but no closer than 12 inches above underground lines. Tape shall be a minimum of 6 inches wide.
10. Refer to Division 31 Section “Earth Moving,” for additional requirements. In event of conflict between this section and Division 31 Section “Earth Moving,” Division 31 Section “Earth Moving” shall apply, unless otherwise indicated by A/E.

B. Provide sleeved penetrations for all cabling access where applicable.

1. Where conduits pass through walls, roofs, ceilings, or floors, contractor shall set sleeves when floors, walls, ceilings or roofs are constructed. If any holes are cut in finished work where sleeves have been omitted, cutting shall be done with a concrete coring machine or other approved means and only with consent of Engineer. All such holes are to be carefully cut and shall not be larger than necessary. These holes are to be entirely covered by escutcheon plates when work is completed. Sleeves shall be made of pipe or rolled sheet steel no lighter than No. 18 gauge.
2. Where conduits pass through sleeves in exterior walls above grade, annular space shall be caulked with oakum and filled inside and out with non-hardening, waterproof sealant finished off flush with both faces of wall.
3. Provide penetration seals for all conduits penetrating the building wall below grade.
    a. Description: The pipe to wall penetration closures shall be "Link-Seal" or equal, as manufactured by PSI/Thunderline Corporation – Houston, TX. Seals shall be modular type, consisting of synthetic rubber shaped to continuously fill the annular space between the pipe and wall opening. After the seal assembly is positioned in the sleeve, the rubber sealing elements shall provide an absolutely water-right seal between the pipe and wall opening. The seal shall be constructed as to provide insulation between the pipe and wall, thus reducing changes of cathodic reaction between these two members.
    b. Wall Opening: Provide “Century-Line” sleeves or equal as manufactured by PSI/Thunderline Corporation – Houston, TX. Contractor shall determine the required inside diameter of each individual wall opening of sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water- tight joint. Sizing (correct Link-Seal model and number of links per seal) may be obtained through manufacturer's catalog. If pipe O.D is non-standard due to coating, insulation, etc. consult Thunderline's factory for engineering assistance and recommendation before proceeding with wall opening detail.
    c. Holes through Structural members: Holes required for conduit of size 5-inches and smaller shall be cut in field at expense of this contractor. Obtain structural engineer’s approval in writing prior to any cutting.
    d. Pitch Pockets: Required for conduit penetrating roof. Seal sleeves and provide flashing.
    e. Painting of telecommunications cabling and components is not permitted. Notify painting contractor that painting of telecommunications cabling and components is not permitted. Protect cabling as necessary to avoid painting.

2.02 MATERIALS AND EQUIPMENT

A. Equipment shall be new, listed by UL and shall conform to NEMA and ICEA standards.

B. Materials used for like service shall be by same manufacturer.

C. All materials and equipment, including any hangers, supports, fastenings or accessory fittings, shall have corrosion protection suitable for atmosphere in which they are installed, whether located indoors or out. Care shall be taken during installation to assure integrity of corrosion protection.

D. All screws, bolts, nuts, clamps, fittings or other fastening devices shall be made up tight. All bolts, screws, nuts and other threaded devices shall have standard threads and heads so they may be installed and replaced when necessary without special tools.

2.03 PRODUCT AND MATERIAL APPROVAL

A. A Specification followed by one or more manufacturers is limited to those manufacturers. Names of other manufacturers may be submitted for approval to A/E and Owner a minimum of ten (10) days prior to receiving bids. Approval will be issued by Addendum if granted.

B. A Specification followed by one or more manufacturers and "or approved equal" is open to all equal products or materials; however, Contractor shall supply one of listed manufacturers at no additional cost if Engineer finds substituted product unsatisfactory.

2.04 CAULKING AND FIRESTOPPING

A. In addition to the requirements in Division 07 Section “Penetration Firestopping,” comply with this Article.

B. All raceway and sleeve penetrations of fire barriers shall be sealed to achieve fire resistance equivalent to fire separation.

1. Maintain fire rating per ASTM E-814 and UL 1479.

2. This assembly must also maintain a watertight seal between floor or wall and pipe.

C. For other penetrations through non-rated walls, partitions, floors and ceilings, caulk the space between raceways and raceway sleeves with non-staining, waterproof gun grade compound. Apply caulking compound by the gun method using nozzles of a proper size to fit the width of joint. Prepare the joint for caulking by packing it tightly with a resilient foam or rope yarn.

D. Products: Subject to compliance with requirements, provide one of the following:

1. Maintain fire rating per ASTM E-814 and UL 1479.

2. Penetration sealant:
   a. 3M Brand "Moldable Putty Pads": and "Moldable Putty Stix"
   b. 3M Brand "Fire Barrier" Caulk, Putty or Penetrating Sealing Systems
   c. Dow Corning "Fire Stop Foam: and "Fire Stop Sealant" systems
   d. Insta-Foam Products, Inc. "Insta-Fire Seal Silicone RTV Foam"
   e. Standard Oil Engineering Materials Company, "Frye Putty"
   f. Chase technology "Chase Foam #CTC PR-855"

3. Intumescent Sealant for use at openings and sleeves involving flexible cable.
   a. 3M Brand "Fire Barrier" caulk or putty, FS-195 Wrap Strip and CS-195 Composite Sheet.
   b. Dow Corning "Fire Stop Intumescent Wrap Strip"
   c. Fox Couplings, Inc. "The Fox Cast-in-Place Coupling"

4. Performance Characteristic: Firestopping materials shall conform to both Flame (F) and Temperature (T) ratings as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test.
    a. ^{O}F Rating shall be a minimum of one hour but not less than the fire resistance rating of the assembly being penetrated.
    b. Conduct the fire test with a minimum positive pressure differential of 0.01 inches of water column.
5. Quality Assurance: Installer qualifications – a firm specializing in firestopping installation with not less than two years of experience or trained and approved by firestopping manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRONIC SAFEFTY AND SECURITY SYSTEMS

A. General

1. All work installed in finished areas shall be concealed.
2. Install systems, materials, and equipment to conform with approved documents.
3. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.
4. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
5. Verify all dimensions by field measurements. Take measurements and be responsible for exact size and locations of all openings required for the installation of work. Proposed dimensions are reasonably accurate and should govern in setting out work. Where detailed method of installation is not indicated or where variations exist between described work and approved practice, direction of the owner's representative on job shall be followed.
6. Workmanship throughout shall conform to the standards of best practice. Marks, dents or finish scratches will not be permitted on any exposed materials, fixtures or fittings. Inside of panels and equipment boxes shall be left clean.
7. Use caution not to exceed the allowed bend radius for respective cables and not to compromise the integrity of the cables during installation by pulling cable management devices too tightly, damaging cables, etc. Raceway/Cabling bending radii shall be minimum as directed by cable manufacturer. Use pulling compound or lubricant, where necessary; compound must not deteriorate conductor or insulation.

B. Cable

1. Provide color-coded jackets to identify different systems.
2. Neatly comb out multiple cable bundled runs to remove tangling and crossing of cables within the bundles. Neatly dress all cable work and provide vertical and horizontal cable management (or other approved method) for properly dressing all work at racks, control panels, backboards etc.
3. Provide spacing between cable bundles to help dissipate heat. Do not cinch cables into tight bundles.
4. Nylon cable ties are not permitted. Bundle cables with “Velcro” style cable straps with a minimum of 1-inch width.
5. All cables shall be supported every 5 feet (or less) and within 12" of device boxes, outlets, racks/cabinets and cable tray.

6. Use separate J-Hook cable support systems for cables belonging to different systems and for cables carrying different operating levels.
7. Loosely secure cables at each J-Hook.
8. Cables shall not be directly or indirectly supported by a suspended ceiling or any other surface, support, material or structure not permissible for this use by all applicable codes and standards.
9. Cables carrying signals of different nominal operating level shall be kept separated to reduce the risk of undesirable cross-talk interference between cables.
10. Keep length of parallel runs to a minimum. Cross cables of different nominal levels at 90 degrees.
11. Provide additional separation as necessary to prevent and remedy any crosstalk.
12. Contractor shall take all precautions necessary to keep low-voltage cable away from sources of EMI and RF interference. Where close proximity is absolutely necessary to satisfactory appearance, performance or installation of the Work, provide all necessary shielding necessary to ensure that ingress interference is minimal and has no negative impact of the Work.
13. Provide a minimum of 12 inches cable slack where terminating at a device outlet to facilitate installation and servicing of devices. Longer working lengths shall be provided as appropriate to the application.
14. All termination types shall correctly match the cable and device termination point. Connectors of the appropriate type, size, color and rating shall be used to match with the mating equipment.
15. Tools as recommended by each specific connector manufacturer shall be used in attachment of all connectors.
16. When spade connectors are the required to be used for audio circuits operating at <= +8dBv nominal, solder type spade connectors only shall be permitted.
17. No more than two spade connectors shall be permitted under a single terminal. Fewer should be used when recommended by the specific manufacturer’s equipment or connector.
18. Wire Nuts
    a. Wire nuts shall not be used in any audio circuit, except when necessary in the following:
        1) 25 Volt Constant-Voltage loudspeaker circuits.
        2) 70.7 Volt Constant-Voltage loudspeaker circuits.
    b. Wire nuts shall not be used in any data or voice communications or remote control circuit.
    c. Wire nuts shall not be used in any circuit which radiates RF energy.
    d. Contractor must advise and gain prior approval of the Owner for any circuit which the Contractor desires to use wire nuts as the means of termination.
19. Drain Wires, Non-insulated Ground Wires and Shields
    a. Drain or non-insulated ground conductors shall be insulated with appropriately sized heat-shrinkable insulated sleeving immediately upon exit from the jacket of the cable. Contractor shall use GREEN colored sleeving unless otherwise necessary to resolve specific color coding conflicts on a given cable. This methodology shall apply to ALL methods of termination, including inline connectors, device plates, direct equipment terminations etc… Sleeving shall be applied to twisted and braided shields once the internal conductors have been combed out or otherwise removed from the center of the shield.

b. Wherever a cable contains a non-insulated conductor within a jacketed cable, the conductors, as they exit the manufacturer's jacket, shall have a piece of heat shrinkable sleeving applied equally over the jacket and the exposed insulated conductors. The length of this sleeving shall be 1" for all cable diameters of .250" or less. For cables diameters larger than .250" the length of the sleeving shall be approximately equal to 4 times the diameter of the cable jacket. Note: This added sleeving is recommended but not mandatory when cable termination occurs fully within the confines of a fully insulated and strain relieved connector. Black shall be used unless otherwise necessary for specific cosmetic or cable identification purposes.

c. A heat-gun of the appropriate temperature, size, type and rating for shrinking the tubing shall be used as recommended by the manufacturer of the sleeving used. Open flame (i.e. matches, cigarette lighters, torches) and direct metal conduction (i.e. soldering iron) methods to shrink the sleeving shall not be permitted. Sleeving which is burnt or otherwise marred shall be removed and replaced.

d. There shall not be any non-insulated exposed conductors within a device backbox, junction box, or equipment rack/cabinet.

20. Unused Conductors

a. Unused conductors shall not be "clipped" or removed from any jacketed cable. Conductors which are not required or used at the end of a jacketed cable shall be kept intact. Conductors shall be fully insulated from one and other to prevent shorts which could occur at either end of the cable. Conductor ends shall also be insulated to prevent shorts to other conductive materials which could come in contact with the conductor.

b. Unused conductors shall be kept the same length as the longest conductor of the cable being used.

c. Attention shall be paid to the proper preparation of all cables and all conductors of these cables. There shall not be nicks to cable jackets, conductor insulation, or the conductors themselves.

d. Special attention should be paid to nicked conductors. Should a conductor be nicked during preparation or termination the cable shall be reworked/replaced to remove the nick.

e. Any voice, data, or coaxial cable that is cut, disconnected, or not terminated at both ends shall be completely removed end to end. Any labels at either end shall be erased. Record drawings shall reflect the removal of these cables.

3.02 ATTACHING TO BUILDING CONSTRUCTION

A. Attach supports to structural members (beams, joists, etc.) rather than to floor or roof slabs. Do not attach to ceiling support wires.

B. Where equipment and raceway are suspended from existing concrete or masonry construction, use expansion shields to attach supports to construction. Expansion shield bolt diameter shall be same size as support rod diameter, hereinafter specified. Expansion shields shall be Star Double, Star Gloxin, Star Loxin or approved equal.

C. Where existing masonry is not suitable to receive and hold expansion shield or where other means of attachment is advantageous, submit alternate method for approval by Engineer.

D. Equipment to be installed in groups shall not be mounted directly to masonry or concrete walls. Mount 1- by 1-inch structural channel such as Unistrut, to wall and secure equipment to these channels.

E. Where raceways are suspended from structural steel building framing or supporting members, provide beam clamps for attaching piping device to building member.

F. Obtain approval from Owner and structural engineer before cutting or welding to structural members, or before hanging heavy equipment.

3.03 ESCUTCHEONS

A. Provide chrome plated escutcheons on material, leaving and entering walls, floors, ceilings, etc.

3.04 EQUIPMENT INSTALLATION

A. All equipment must be installed such that maintenance and service may be properly accomplished. If necessary, the Owner, at their option, may require the contractor to demonstrate the service on any piece of equipment to determine sufficient service space exists. If the service space is not adequate, the equipment shall be relocated at no additional cost to the Owner such that sufficient service space is achieved.

3.05 OCCUPATIONAL SAFETY & HEALTH STANDARDS

A. All work shall comply with current requirements of U.S. Department of Labor-Occupational Safety & Health Administration, entitled Occupational Safety and Health Standards; National Consensus Standards and Established Federal Standards.

3.06 DEMOLITION

A. In addition to the requirements in Division 02 Section “Selective Demolition,” comply with this Article.

1. Scope of Work: Provide demolition required for removal of systems and equipment made obsolete by this Project and as determined by the Architect/Engineer.

2. Work Included:

a. Non-destructive removal of systems, materials, and equipment for reuse or salvage as shown on Drawings or requested by Owner.

b. Removal of all debris from site and legal disposal of same.

c. Removal of all abandoned or obsolete exposed materials and equipment for a clean and finished installation.

d. Removal of all abandoned or obsolete raceways, wiring, cabling, or electrical devices of any kind.

B. Conditions

1. Coordination: Adjacent areas need to remain in operation and services to these areas need to be maintained. A schedule will be worked out prior to beginning work and as many criteria for operation as possible will be explained. Contractor cooperation shall be expected in all conditions.

a. Phasing: Prior to commencing demolition in any area of the work, notify the Owner and Architect/Engineer five (5) working days in advance to insure that no adjacent occupied areas will be disrupted.

b. Demolition phasing must be approved by Architect/Engineer prior to commencement of operations.

c. Removal of debris and construction traffic will be limited to specified areas. Confirm all operations with Architect/Engineer prior to commencement of work.

2. Adjacent Materials:

a. During the execution of the work, primary consideration shall be given to protecting from damaging the structure, furnishings, finishes, and the like which are not specifically indicated to be removed and disposed.

b. Existing items or surfaces to remain which are damaged as a result of this work shall be refinished, repaired, or replaced to the satisfaction of the Architect/Engineer and Owner at no additional cost.

C. Materials

1. Patching: Materials used for patching shall be in conformance with the applicable sections of the Project Manual. Where materials are not specifically described but required for proper completion of the work, they shall be as selected by the Contractor subject to approval of the Architect/Engineer. Materials used and workmanship shall match surrounding areas as much as possible, unless otherwise directed.

D. Demolition

1. Site Inspection
   a. The Contract Documents do not propose to show all systems, materials, or equipment existing on the project that will require demolition.
   b. Before commencing the work of this Section, verify with the Architect/Engineer and Owner all systems, materials, and equipment to be removed and those to be preserved.
2. Scheduling
   a. Schedule all work in a careful manner with all necessary considerations for public and adjacent areas.
   b. Avoid interference with the use of adjacent areas and passage to and from these areas.
3. Abandoned Materials and Equipment: Items so indicated on Contract Documents to be removed and not indicated or specified to be saved or retained, shall be demolished, removed, demounted, or disconnected in the best possible manner to ensure that no damage will result to other adjacent items or surfaces to remain.
4. Salvage
   a. During removal of items so indicated, caution shall be used to eliminate damage to any equipment having salvage value.
   b. All reusable salvaged material shall remain the property of the Owner and be retained for his inspection. Only items so inspected and rejected by the Owner shall be disposed by the Contractor. All other such items shall be turned over and deposited as directed by the Owner.
5. Disposal and Clean Up
   a. Areas in which demolition and salvage work is being done shall be cleaned daily.
   b. Dirt, dust, debris, unsalvageable and reusable items, and the like shall be totally removed from the project site daily. Under no circumstances shall such refuse be allowed to collect for longer periods.
   c. Refuse shall not be allowed to block, or otherwise impair, circulation in corridors, stairs, sidewalks, or other traffic areas.

END OF SECTION 28 05 00

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers fire alarm system's' initiating devices, notification appliances, controls, and supervisory devices.

B. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.

1.02 ACCEPTABLE MANUFACTURERS

A. Manufacturers: The equipment and service described in this specification are those supplied and supported by Johnson Controls Fire Protection, LP (Simplex).

B. No Substitutions allowed; must match the Campus fire alarm network systems.

1.03 RELATED DOCUMENTS

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

B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:

1. Division 26: applicable sections apply

C. The system and all associated operations shall be in accordance with the following Guidelines of the following Building Code: UBC IBC

1. NFPA 72, National Fire Alarm Code
2. NFPA 70, National Electrical Code
3. NFPA 101, Life Safety Code
4. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
5. Other applicable NFPA standards
6. Local Jurisdictional Adopted Codes and Standards
7. ADA Accessibility Guidelines

1.04 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.

2. Wiring diagrams from manufacturer.

3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of Tru-Site graphic screens.

4. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.

5. Record of field tests of system.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A factory authorized installer is to perform the work of this section.

B. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

C. Exception: Notification Appliance Devices by COOPER Notification (Wheelock) are

acceptable

PART 2 - PRODUCTS

2.01 ADDRESSABLE MANUAL PULL STATIONS

A. Description: Addressable single- or double-action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

B. Protective Shield: Where required provide a tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.

2.02 SMOKE SENSORS

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

1. Factory Nameplate: Serial number and type identification.
2. Operating Voltage: 24 VDC, nominal.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
4. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.
5. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
6. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
7. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
8. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
9. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
10. Removal of the sensor head for cleaning shall not require the setting of addresses.

B. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type.

C. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

D. Duct Smoke Sensor:

1. Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.
2. Environmental compensation, programmable sensitivity settings, status testing, and

monitoring of sensor dirt accumulation for the duct sensor shall be provided by the FACP.

3. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
4. Duct Housing shall provide a relay control trouble indicator Yellow LED.
5. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
6. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
7. Duct Housing shall provide a magnetic test area and Red sensor status LED.
8. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
9. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.

2.03 HEAT SENSORS

A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.

B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.

D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.04 ADDRESSABLE CIRCUIT INTERFACE MODULES

A. Individual addressable modules (IAMs)

1. Both power and communications from a two-wire MAPNET II or IDNet circuit. They provide location specific addressability to a single initiating device (such as single station smoke detector alarm contacts or heat detector contacts) or multiple devices at the same location by monitoring normally open dry contacts and the wiring to an end-of-line resistor.
   a. Total wiring distance from IAM to supervision resistor(s) of up to 500 ft (152 m)
   b. Monitored connection is compatible with Simplex® 2081-9044 Overvoltage Protectors for outdoor wiring or electrically noisy applications
   c. For use in indoor locations up to 158° F (70° C) such as attic spaces or similar applications.
2. Model 4090-9001 is packaged in a thermoplastic housing and provides screw terminal connections and a status indicating LED. (***ISU Standard choice***)
   a. Enclosed design minimizes dust infiltration
   b. Mounts in standard single gang electrical box
   c. Screw terminals for wiring connections
   d. Visible LED flashes to indicate communications
   e. Optional covers are available to allow LED to be viewed after installation (requires mounting bracket, ordered separately)
3. Model 4090-9051 is an encapsulated package with wire leads. It does not provide a status indicating LED.
4. IDNet communications provides current limited monitoring:

a. Provides monitoring of tamper switch (supervisory) and waterflow switch (alarm) on same circuit using one point
b. Available with IDNet communications only
c. Multiple operation modes are available and are selectable at the control panel:
a. Contact closure status can be tracked
b. Momentary contact closure conditions can be selected at the panel to be latched or tracked.

B. Individual Addressable Relay Module (Relay IAM)

1. IDNet Relay IAMs allow fire alarm control panels to control a remotely located Form “C” contact using IDNet addressable communications for both data and module power. Typical applications would be for switching local power for control functions such as elevator capture, or control of HVAC components, pressurization fans, dampers, etc. Relay status is also communicated requiring only one device address.

a. A single addressable point provides control and status tracking of a Form “C” contact
b. Contact Rating
1) Power Limited 2A @ 24VDC resistive
2) Power Limited 1A @ 24VDC inductive
3) Non-power limited 0.5A @ 120VAC resistive
c. Low power latching relay design allows IDNet communications to supply both data and module power
d. Relay is set to OFF on initial power up and upon loss of IDNet communications
e. Enclosed design minimizes dust infiltration
f. Mounts in standard 4” (102 mm) square electrical box, optional adapter bracket is available to mount in a 4 11⁄16” (119 mm) square electrical box
g. Screw terminals for wiring connections
h. Visible LED flashes to indicate communications
i. Optional covers are available to allow LED to be viewed after installation

C. Dual Contact Relay IAM (Individual Addressable Module)

1. Same as Addressable Relay Module (Relay IAM) , item B above, except with two form C contacts on common relay.

2.05 STANDARD ALARM NOTIFICATION APPLIANCES

A. Alarm notification appliances by Simples Grinnell and COOPER Notification (Wheelock) are acceptable. Match existing fire alarm device styles when possible.

B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

C. Speaker/Visible: Combination Speaker/Visible (S/V) units combine the speaker and visible functions into a common housing. The S/V shall be listed to UL 1971 and UL 1480.

1. Twisted/shielded wire is required for speaker connections on a standard 25VRMS or 70.7VRMS NAC using and UTP conductors, having a minimum of 3 twists per foot is required for addressable strobe connections.

2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.

3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to

12kHz for General Signaling.

4. The S/V installs directly to a 4" square, 1 ½ in. deep electrical box with 1 1/2" extension for Simplex devices and a 4” square 1 ½ in. deep for Wheelock devices.

D. Speaker: Speaker notification appliances shall be listed to UL 1480.

1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted / shielded wire.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
4. The Speaker installs directly to a 4" square, 1 ½ in. deep electrical box with 1 1/2" extension for Simplex devices and a 4” square 1 ½ in. deep for Wheelock devices.

E. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz. The capability to synchronize multiple notification appliance circuits shall be provided.

F. Accessories: The contractor shall furnish the necessary accessories.

G. NAC Power Extender

1. The IDNet NAC Power Extender panel shall be a stand-alone panel capable of powering a minimum of 4 notification appliance circuits. Notification appliance circuits shall be [Class B Style Y][Class A Style Z] rated at 2 amps each. Panel shall provide capability to be expanded to 8 notification appliance circuits.
2. The internal power supply & battery charger shall be capable of charging up 12.7 Ah batteries internally mounted or 18Ah batteries mounted in an external cabinet.
3. The NAC extender panel may be mounted close to the host control panel or can be remotely located. The IDNET Addressable NAC Extender Panel when connected to an addressable panel shall connect to the host panel via an IDNet communications channel. Via the IDNET channel each output NAC can be individually controlled for general alarm or selective area notification.
4. For IDNet connected NAC extender panels up to five panels can be connected on a single [Class A wired] IDNet channel.
5. When connected to a conventional (non-addressable panel) one or two standard notification appliance circuits from the main control panel may be used to activate all the circuits on the NAC power extender panel.
6. Alarms from the host fire panel shall signal the NAC power extender panel to activate. The panel shall monitor itself and each of its NACs for trouble conditions and shall report trouble conditions to the host panel.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

1. Factory trained and certified personnel.
2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
3. Personnel licensed or certified by state or local authority.

3.02 WIRING INSTALLATION

A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AH and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).

B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.

C. Paint fire alarm system junction boxes covers red.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.
2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
3. International Municipal Signal Association (IMSA) fire alarm certified.
4. Certified by a state or local authority.
5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pre-testing: Determine, through pre-testing, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

H. Final Test, Certificate of Completion, and Certificate of Occupancy:

I. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.04 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.05 SPECIAL INSTALLATION INSTRUCTIONS

A. Existing devices shall be protected during the construction phase for re-use. Contractor to

protect all existing fire alarm devices during entire renovation project to prevent dust and debris infiltration. Devices not protected shall be cleaned by the fire alarm system manufacturer's service representative. Any devices damaged beyond repair / cleaning will be replaced with new at no cost to the Owner. Plastic bagging of devices is acceptable.

B. Coordinate with the Owner for disabling fire alarm devices during construction. Turn over any fire alarm devices not slated for re-use to the Owner.

C. Include in the Bid all costs associated with reprogramming of the existing fire alarm system and Owner's Tru-Site fire alarm network for this Project.

D. Wiring to devices above suspended ceilings may be exposed plenum rated cable. Wiring to exposed surface mounted devices or wiring concealed in walls to devices shall be in metal raceway.

E. New devices shall match existing devices being re-used. If devices are not available to match existing all new devices of that type shall be provided.

END OF SECTION 28 31 12

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