SPECIFICATIONS FOR

FIRE ALARM REPLACEMENT & RELATED WORK

AT

SEVERAL SCHOOLS

RAISINVILLE ELEMENTARY SCHOOL

2300 NORTH RAISINVILLE ROAD, MONROE, MI 48162

FILE #26103

ORCHARD CENTER HIGH SCHOOL

1750 OAK STREET, MONROE, MI. 48161

FILE #26104

FOR

MONROE PUBLIC SCHOOLS

1275 NORTH MACOMB STREET, MONROE, MI. 48162

FEBRUARY 9, 2026

KOHLER
ARCHITECTURE
www.kohlerarchitect.net
1110 WEST FRONT STREET
MONROE, MI. 48161
PH:(724)242-6880

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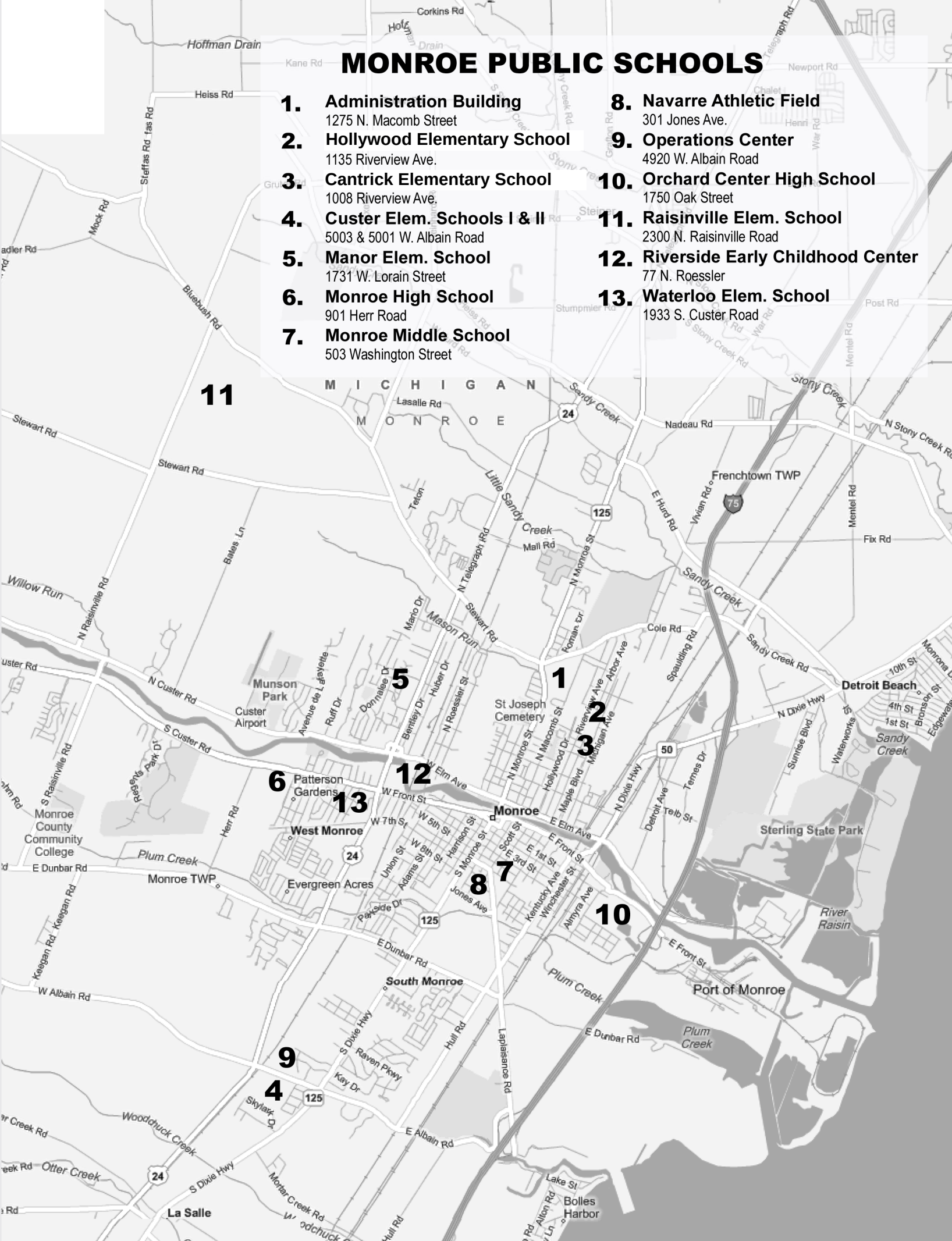

ADVERTISEMENT FOR BIDS

OWNER: Monroe Public Schools
1275 North Macomb St
Monroe, MI. 48162
Phone: (734) 265-3000

ARCHITECT: **KOHLER** ARCHITECTURE
1110 West Front St.
Monroe, MI. 48161
Phone: (734) 242-6880

PROPOSALS: Separate sealed proposals for Prime Contractors are invited for the following construction work: **Fire Alarm Replacement and Related Work at Several Schools (#26103) Raisinville Elementary School, 2300 N. Raisinville Rd., Monroe, MI. 48162, and at (#26104) Orchard Center High School, 1750 Oak Street, Monroe, MI. 48161, for Monroe Public Schools, 1275 North Macomb Street, Monroe, MI. 48162** Proposals are for all projects and complete, including all trades (Sub-Contractors and Suppliers), as the successful Contractor will be considered a Prime Contractor entering into a direct contract with the Owner.

DUE DATE: Proposals will be received by the owner until **Wednesday, March 11, 2026 at 3:00 P.M.**, at the Monroe Public Schools Administration Building, 1275 North Macomb Street, Monroe, MI 48162. Bids will be publicly opened and read aloud at that time at the same location. The School Board will not consider or accept any bid submitted after the due date and time.

PLANS: Electronic pdf copies will be available for viewing and/or downloading at no cost from the Monroe Public Schools website at **https://bids.monroe.k12.mi.us.** Hard copies of plans and specifications may be purchased for $150.00 for each set from the office of Kohler Architecture, Inc. located at 1110 West Front Street, Monroe, Mi., 48161.

The project will be advertised on the Buy4Michigan.com website and at Builders Exchange of Michigan, Grand Rapids, MI; CMD (Construction Market Data).Norcross, GA; Construction Association of Michigan, Bloomfield Hills, Mi.; Dodge Data & Analytics. Cincinnati, OH. Only bidders registered with the Architect will be sent any addendums and receive any other information regarding this project.

MANDATORY PRE-BID MEETING: A mandatory pre-bid meeting will be held at the job sites **Thursday, February 26, 2026. Orchard Center High School – 3:30 P.M., Raisinville Elementary School – 4:15 P.M.**

These meetings are for the Prime Contractors, (NOT Sub-Contractors), to gain knowledge about the project and submit proof of qualifications for pre-approval. The Architect's Project Manager, will be at this meeting to clarify the bidding procedures, scope of work, identify any items of concern and answer questions from the Bidders for their preparation and submission of representative competitive bids. It is the Contractor's responsibility to assure the Architect has been furnished all necessary information as listed in Instructions to bidders at or prior to this meeting. The Architect will assemble an official list of approved bidders two days after the mandatory pre-bid meeting. The list will be limited to Contractors who attend the entire pre-bid meeting, have signed an official attendance list, have checked out official plans and specifications from the Architect, and meet the minimum Contractor qualifications as listed in the Instructions to Bidders. **Bids submitted by Contractors who are not on the approved bidders list or do not meet these pre-bid requirements will not be opened and will be returned to the bidder.**

PROPOSAL GUARANTEE: The proposal must be accompanied by a certified check or bid bond by an approved surety company in the amount of five percent (5%) of the proposal submitted payable to the Owner. Proposals shall remain firm for a period of sixty (60) days after official opening of bids.

CONTRACT SECURITY: The successful Contractor will be required to furnish performance, labor and material bonds, each in the full amount of the proposal if payments are issued prior to completion and/or the contract is $50,000.00 or more.

FAMILIAL DISCLOSURE: All bidders must provide disclosure in compliance with MCL 380.1267 and attach this information to the bid. The bid shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the Owner or the employee of the bidder and any member of the board, intermediate school board, or board of directors or the superintendent of the school district, intermediate superintendent of the intermediate school district, or chief executive officer of the public school academy. The District shall not accept a bid that does not include this sworn and notarized disclosure statement.

IRAN ECONOMIC SANCTIONS ACT COMPLIANCE: All bidders must provide a sworn and notarized statement in compliance with Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 and attach this information to the bid. The District shall not accept a bid that does not include this sworn and notarized statement.

RIGHT RESERVED BY OWNER: The Owner reserves the right to waive any irregularities, reject any or all bids, or accept the bid that in the opinion of the Owner, will serve the best interests of the Owner.

Kohler Architecture, Inc.

1110 West Front Street
Monroe, Michigan 48l6l

PROPOSAL FORM
(Submit in Duplicate)

To: Secretary of the School Board:

Having carefully examined the Instructions to Bidders, the Specifications and Drawings, including Addendum No._____, all entitled, “Fire Alarm Replacement and Related Work at Several Schools (#26103) Raisinville Elementary School, 2300 N. Raisinville Rd., Monroe, MI. 48162, and at (#26104) Orchard Center High School, 1750 Oak Street, Monroe, MI. 48161, for Monroe Public Schools, 1275 North Macomb Street, Monroe, MI. 48162", as well as the premises and the conditions affecting the work, the undersigned agrees to furnish all labor and materials to perform the work, including All Trades, and agrees to accept in payment therefore, the sum of:

PROPOSAL A (Base Bid)

_____ Dollars

($_____)

The following form of bid guarantee, as indicated below, is herewith enclosed, representing 5% of the amount of the Total Bid, including Alternates, payable to the Owner:

Certified Check_____ Bid Bond_____

It is agreed that this bid may not be withdrawn for a period of 60 days. The Owner reserves the right to waive any irregularities, reject any or all bids or accept the bid that in the opinion of the Owner will serve the best interest of the Owner.

Guaranteed Maximum percentage of mark-up values on change orders including Overhead, profit, bond, insurance, wage rates, and equipment rates for BOTH prime contractors and subcontractors will not more than _____%.

The undersigned agrees, if awarded the contract, to commence construction immediately and to complete work as noted in Division #1. (Notes: See Supplemental and Special conditions for Liquidated Damages and Instructions to Bidders for Architect's Inspections and Additional Services.)

PROPOSAL FORM
(Submit in Duplicate)

SUB-CONTRACTORS - The undersigned submits for your approval herewith as a condition of being awarded the contract, the **separately attached list** of Contractors to whom it is proposed to let portions of this work, agreeing in every way to be responsible for the work, materials, equipment and supplies furnished by each and all of them. **A tentative list shall be submitted with bid and confirmed/verified no later than 24 hours after bid opening.**

SUBSTITUTIONS - The following is a list of manufacturers or trade names of substitute materials and equipment, which the undersigned submit for consideration, guaranteeing the same to conform to exact requirements of the specifications. The additions, deductions or no-charge figures indicated are separate from and not part of the proposal. **A tentative list shall be submitted with bid and confirmed/verified no later than 24 hours after bid opening.**

Item	Substitute Mfr./Trade Name	Add	Deduct	No Charge
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

FAMILIAL DISCLOSURE – As required by the State of Michigan, and included as part of this proposal, shall be an Affidavit for Statement Regarding Familial Relationship, completely filled out and signed.

IRAN ECONOMIC SANCTIONS ACT COMPLIANCE - As required by the State of Michigan, and included as part of this proposal, shall be an Affidavit of Compliance of the Iran Economic Sanctions Act, Michigan Public Act No. 515 of 2012, completely filled out and signed.

BIDDER'S COMPLIANCE ASSURANCE- **Sign in the space provided below to confirm that you have read, understand, and will comply with the requirements as stated in this project manual, including, but not limited to the sections dealing with the following: (1) criminal/security checks/records and, (2) Qualification of Bidders.**

(PLEASE PRINT OR TYPE)

Date _____ Firm_____

Address _____ By _____

_____ Signature _____

Phone _____ Title _____

Email _____ Fed. Tax ID _____

STATEMENT REGARDING FAMILIAL RELATIONSHIP

AFFIDAVIT OF _____
(insert name of affiant)

STATE OF _____) SS:

COUNTY OF _____)

_____ makes this Affidavit under oath and states as follows:
(insert name of affiant)

1. I am a/the:
   - ☐ President
   - ☐ Vice-President
   - ☐ Chief Executive Officer
   - ☐ Member
   - ☐ Partner
   - ☐ Owner
   - ☐ Other (please specify) _____

of _____, a bidder on a construction project for
(insert name of contractor)

Monroe Public Schools that involves, at least in part, construction of a new school building or an addition to or repair or renovation of an existing school building or other facilities.

2. I have personal knowledge and/or I have personally verified that the following are all of the familial relationships existing between the owner(s) and the employee(s) of the aforementioned contractor and the school district's superintendent and/or board members: (leave blank if none)

_____

_____

_____

3. I have authority to bind the aforementioned contractor with the representations contained herein, and I am fully aware that the school district will rely on my representations in evaluating bids for the construction project.

4. I declare the above information to be true to the best of my knowledge, information and belief. I could completely and accurately testify regarding the information contained in this affidavit if requested to do so.

_____
(signature of affiant)

Dated: _____

Subscribed and sworn before me in _____ County,

_____, on the ___ day of _____, 20____.
(state)

_____ (signature)

_____ (printed)

Notary public, State of _____, County of _____

My Commission expires on _____

Acting in the County of _____

AFFIDAVIT OF COMPLIANCE
IRAN ECONOMIC SANCTIONS ACT
Michigan Public Act No. 517 of 2012

AFFIDAVIT OF _____
(insert name of affiant)

STATE OF _____) SS:

COUNTY OF _____)

_____ makes this Affidavit under oath and states as follows:
(insert name of affiant)

1. I am a/the:
   - ☐ President
   - ☐ Vice-President
   - ☐ Chief Executive Officer
   - ☐ Member
   - ☐ Partner
   - ☐ Owner
   - ☐ Other (please specify) _____

   of _____, a bidder on a construction project for
   (insert name of contractor)
   Monroe Public Schools that involves, at least in part, construction of a new school building or an addition to or repair or renovation of an existing school building or other facilities.

2. I personally certify, represent and warrant that the Bidder (including its officers, directors and employees) is not an "Iran Linked Business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event the Bidder is awarded a Contract as a result of the aforementioned Advertisement for Bids, the Bidder will not become an "Iran Linked Business" at any time during the course of performing under the Contract.

   The Bidder further acknowledges that any person as that term is defined in Section 2(f) of the "Act" who is found to have submitted false certification is responsible for a civil penalty of not more than $250,000.00 or 2 times the amount of the Contract or proposed Contract for which the false certification was made, whichever is greater plus the cost of the Owner's investigation, and reasonable Attorney fees in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on an Invitation to Bid or submit a proposal as to any Request for Proposals for a period of three (3) years from the date that it is determined that the person has submitted the false certification.

3. I have authority to bind the aforementioned contractor with the representations contained herein, and I am fully aware that the school district will rely on my representations in evaluating bids for the construction project.

4. I declare the above information to be true to the best of my knowledge, information and belief. I could completely and accurately testify regarding the information contained in this affidavit if requested to do so.

_____
(signature of affiant)

Dated: _____

Subscribed and sworn before me in _____ County,

_____, on the ___ day of _____, 20____.
(insert state)

_____ (signature)

_____ (printed)

Notary public, State of _____, County of _____

My Commission expires on _____

Acting in the County of _____

Project Schedule

This reflects an anticipated project schedule for this construction project. Contractors shall familiarize themselves with this schedule and note any conflicts on the proposal form. The project schedule will be reviewed, coordinated, and finalized at the contractor/owner pre-construction meeting.

Description	**Date**
Out for Bids	February 9, 2026
Mandatory Pre-bid Meeting	February 26, 2026 at 3:30 pm Orchard Center High School at 3:30 pm Raisinville Elementary School at 4:15 pm
Official Bidders List	February 27, 2026
Bids Due	March 11, 2026 at 3:00 pm
Post Bid Interviews	March 12-17, 2026
Architect Recommendation	March 18, 2026
Owner Awards Project	March 24, 2026
Notice to Proceed Letters	March 25, 2026
All Shop Drawing Reviews Complete	May 22, 2026
Pre-Construction Meeting	May 22, 2026 – Time and place TBD
Physical Construction	June 15, 2026 – August 14, 2026
Substantial Completion	August 14, 2026
Owner Move-in Date	August 19, 2026
Final Completion	September 14, 2026

Kohler Architecture, Inc.
1110 West Front Street
Monroe, MI. 48161
(734)242-6880

Files: \26103-26104 Project Schedule

SECTION 002113
INSTRUCTIONS TO BIDDERS

INVITATION

1.01 PROPOSAL SUBMISSION

A. Bids signed and sealed, executed, and dated will be received per the Advertisement for Bids.

B. Submit required Supplements To Bid Forms within 24 hours after closing time for receiving bids.

C. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.

1.02 INTENT

A. All work specified in this project manual shall be bid as one package. The prime contractor (assumed Electrical Contractor) shall be responsible to assemble and collect all parts, materials, equipment, labor, etc. as required for a complete finished installation at completion. Included shall be architectural (patching, demolition, finishes, roofing, etc.) mechanical, electrical, plumbing, and all other related trades as required for a complete project.

1.03 CONTRACT TIME

A. The bidder, in submitting an offer, will perform the Work within the time stated in Section 001300 - Project Schedule.

BID DOCUMENTS AND CONTRACT DOCUMENTS

2.01 CONTRACT DOCUMENTS IDENTIFICATION

A. All work shall be performed under this contract as described in this project manual as prepared by Kohler Architecture, Inc. Included, but not limited to are; Title Sheet, Index, Advertisement for Bids, Bid Proposal Form, Instructions to Bidders, Certificate of Insurance, Specifications - All Divisions, Drawings, etc.

2.02 AVAILABILITY

A. Electronic pdf copies will be available for viewing and/or downloading at no cost from the Monroe Public Schools website at **https://bids.monroe.k12.mi.us.** Hard copies of plans and specifications may be purchased for $150.00 for each set from the office of Kohler Architecture, Inc. located at 1118 West Front Street, Monroe, MI., 48161. These are the official and only recogonized places that addenda and other information regarding this project will be posted.

B. The project will be advertised on the Bid4Michigan.com website and at Builders Exchange of Michigan, Lansing, MI; Construct Connect (formerly CMD), Norcross, GA; Construction Association of Michigan, Bloomfield Hills, Mi.; Dodge Data & Analytics. Cincinnati, OH.

C. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

2.03 EXAMINATION

A. Bid Documents may be viewed at the office of Architect.

B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.

C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

D. Each bidder shall examine all drawings, specifications and all other data or instructions pertaining to the work. No plea of ignorance of conditions that exist or of difficulties of conditions that may be encountered, or of any other relevant matter concerning that work to be performed in the execution of the work will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill every detail of all the requirements of the contract documents, governing the work. The bidder, if awarded the contract, will not be allowed extra

compensation by reason of any matter or thing concerning which such bidder might have fully informed himself prior to bidding.

2.04 INQUIRIES/ADDENDA

A. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.

B. If any person contemplating submitting a bid is in doubt as to the true meaning of any part of the plans or specifications, or other proposed contract documents, or requesting a change, they shall submit to the Architect a written request for interpretation which shall be delivered to the Architect at least (7) days before the opening of bids. Any interpretation of the proposed documents will be made only by an addendum duly issued.

C. Such addendum will be posted in the same manner as original bid documents. If after the pre-bid meeting and approved bidders are known, notice of such addendum may be emailed to each approved bidder. It shall be the bidder's responsibility to make inquiry as to addenda issued. Any addendum issued during the time of bidding shall be included in the bid, and in closing a contract will become a part thereof.

D. Any verbal information obtained from or statements made by representatives of the Owner or Architect at the time of examination of the contract documents or site shall not be construed as in anyway amending the contract documents. Only such corrections or addenda as are issued in writing to all bidders shall become a part of the contract. Neither the Owner nor the Architect will be responsible for verbal instructions. Verbal answers are not binding on any party.

2.05 VOLUNTARY SUBSTITUTIONS

A. For a bid proposal to be accepted by the Owner, and considered for contract award, it must contain costs to perform the work exactly as specified. The bidder is required to perform all work, all materials, etc., as specified. Voluntary substitutions may be listed in the bid proposal by the bidder but will only be considered if the Contractor first bids on the work as specified. The bidder must be considered the lowest bonafide, qualified, bidder in the base specified bid before the voluntary substitution is considered.

B. If a bidder feels a product, assembly of products, or an equal solution is available to perform the same design intent, he shall contact the Architect for review and if approved, will be issued in an addendum as described elsewhere, as an "approved equal".

SITE ASSESSMENT

3.01 SITE EXAMINATION

A. The bidder shall carefully examine the site of each project and surrounding territory, the means of approach to the site and the structure of the ground and make all necessary investigations required to inform himself thoroughly and fully as to facilities for delivery, storing, placing and handling of materials and equipment and to inform himself fully as to all difficulties that may be encountered in the complete execution of all work in accordance with the contract documents.

B. For making appointment to visit the site and enter the building, bidders should contact:
Mr. Tim Salenbien, Custodial/Maintenance Supervisor, Monroe Public Schools, 4920 West Albain Road, Monroe, MI 48161 (Phone 734-265-3333)

3.02 MANDATORY PRE-BID MEETING

A. A mandatory pre-bid meeting will be held at the time and place noted in the Advertisement for Bids. This meeting is for the Prime Contractors, (NOT Sub-Contractors), to gain knowledge about the project and submit proof of qualifications. The Architect’s Project Manager, will be at this meeting to collect proof of qualification documentation, clarify the bidding procedures, scope of work, identify any items of concern and answer questions from the Bidders for their preparation and submission of representative competitive bids. It is the Contractor’s responsibility to assure the Architect has been furnished all necessary documentation as listed below at or prior to this meeting. The Architect will assemble a list of bidders within seven days after the mandatory pre-bid meeting. The list will be limited to Contractors who attend the

entire pre-bid meeting, have signed an official attendance list, and meet the minimum Contractor qualifications as listed in the Instructions to Bidders, and the Advertisement for Bids. **Bids submitted by Contractors who are not on the approved bidders list or do not meet these pre-bid requirements will not be opened and will be returned to the bidder.**

B. See Contractor Requirements Section for list of Qualifications to be delivered to the Architect, **at or before**, the Mandatory Pre-Bid Meeting:

CONTRACTOR REQUIREMENTS

4.01 EVIDENCE OF QUALIFICATIONS

A. The following is a list of items to be delivered to the Architect, at or before, the Mandatory Pre-Bid Meeting:
   1. Contractor's Qualification Statement - AIA A305 Current edition (copies available from the AIA, www.documentsondemand.AIA.org) setting forth previous experience, references, physical plant and equipment possessed, description of organizations, financial resources, conformance with special requirements, qualification statement and such other evidence as may testify to his ability to carry out the contract..
   2. List of Job References for minimum 5 similar (type/size) projects with current contact names and phone numbers providing company experience.
   3. Resumes of key personnel including Project Manager and Project Superintendent providing individual's name, address, current driver's license or legal photo I.D, trade classification, years of trade experience and years employed by contractor.
   4. Equipment list providing physical plant and equipment possessed.
   5. Other such evidence as may testify to the Contractor's ability to carry out the contract.

4.02 SPECIAL REQUIREMENTS

A. All Contractors and Sub-Contractors shall comply with the following conditions:
   1. The main office of all Contractors, Sub-Contractors, and other bidders shall be located within approximately a fifty (50) mile radius from the job site.
   2. The Contractor and their Sub-Contractors shall give preference to using local firms for labor and materials where practical without sacrificing the quality, time schedule and cost of the project. Local is defined as that available within the boundaries of Monroe County.
   3. The Owner expects the Contractor to utilize local Sub-Contractors and suppliers when all other factors are similar and when it would serve the Owner's best interest. Other factors that will be used in awarding a contract include cost, past projects and performance, time schedule, qualifications, credit/financial history, bonding capability, etc.
   4. Contractor's Qualifications:
      a. Experience - The Prime Contractor shall have been in business under its present name and ownership for the last five (5) years. The Prime Contractor shall have completed a minimum of five (5) projects similar to this project, in type and size, using the materials and manufacturers as herein specified.
      b. Personnel - The Prime Contractor shall have a minimum of (3) regular full-time employees (Estimators, Superintendents, Laborers, etc.) on his company payroll that are qualified with the appropriate skills to perform the work specified. This excludes Owners/Officers of the company.
      c. Project Superintendent - Shall be sufficiently experienced to coordinate and be responsible to direct all workers and Sub-Contractors in the installation of the work and for taking instructions from the Owner/Architect. **The Project Superintendent shall be on the job site at all times that construction is in progress.** He shall also be responsible to up-date an accurate "As-Built" drawing of all trades on a daily basis to be submitted to the Architect at job completion.
      The same Superintendent shall remain on the job from beginning to end, unless written approval is given by the Architect, in advance. This is to avoid additional costs the Owner will incur should the Architect have to repeat directives, review

changes, or any other additional services required to get the replacement Foreman educated with the project's details and scope.

d. Franchised Installer - The Prime Contractor, or any Sub-Contractor shall be franchised and approved by the manufacturer of the components, or system, which is to be installed for the last five (5) years. Contractor shall submit a letter from the component manufacturer, stating this Contractor's previous performance rating of installation of the component on the last ten (10) completed projects.

e. Equipment - The Prime Contractor shall possess sufficient equipment, tools, safety items, etc., to properly install the work and to ensure the necessary security and safety of the job site, the workers and the occupants.

5. As all of the above items are essential conditions for awarding a contract, the three lowest bidders shall submit the following required items no later than twenty-four (24) hours following the bid opening:
   a. Finalized Sub-Contractor list with each worker's name, address, social security number, trade classification, years of trade experience and years employed by Sub-Contractor. See other Divisions of these specifications that may set ratios of apprentices to journeymen.
   b. Anticipated material supplier list.
   c. Guaranteed Maximum percentage of mark-up values on change orders including Overhead, profit, bond, insurance, wage rates, and equipment rates for BOTH prime contractors and subcontractors.

   If the Owner awards a contract, sub-contractors shall not be changed by the Contractor unless approved in writing by the Owner. Request for changes shall be submitted by the Contractor, stating the reason(s) for the change, along with all supporting documentation.
6. Any bidder not in agreement or conformance with these conditions shall request a waiver at the time of submitting the bid. Otherwise if a contract is awarded to a Contractor not requesting a waiver, the Contractor will be required to conform as specified.
7. The contractor shall not employ and shall not subcontract with a subcontractor of any degree that employs, an individual required to be registered under Article 2 of 1994 PA 295, as amended, who will be assigned to work within a student safety zone, as that term is defined in 1994 PA 295, as amended.

   Neither the contractor nor subcontractor thereof of any degree shall assign to the Owner's Project any individual, and the Owner shall not allow any individual, to regularly and continuously work under contract in any of the Owner's schools if the reports on an individual's criminal history or criminal records check have not been received or if those checks would disclose or do disclose that individual has been convicted of a felony other than a "listed offense" as that term is defined in Section 2 of the Sex Offenders Registration Act, 1994 PA 295, as amended, or which disclose that individual has been convicted of a felony other than a "listed offense" unless the Superintendent and the Board of the Owner each specifically approve of the work assignment in writing. Additionally, the contractor agrees that it shall not assign any of its employees, agents or other individuals to perform, and shall not permit any of its subcontractors to assign personnel to perform, any services under this Agreement where such individuals would regularly and continuously work in the school district's facilities or program sites if such person has been convicted of any of the following offenses:
   a. Any "listed offense" as defined under Section 2 of the Sex Offenders Registration Act, MCL 28.722; or
   b. Any offence that would, in the judgment of the Board, create a potential risk to the safety and security of students served by the school district or employees of the school district; or
   c. Any offense enumerated in Sections 1535a (1) or 1539b of the Revised School Code, MCL 380.1535a(1) or MCL 380.1539b; or
   d. Any offense of a substantially similar enactment of the United States or another State.

Any personnel of the contractor or of the subcontractors thereof of any degree that have been charged with any of the above-referenced crimes shall immediately report that circumstance to the Owner's superintendent and shall not be permitted to work in any of the schools of the Owner during the pendency of the prosecution associated with such charge(s). The Owner reserves the right to refuse contractor's assignment of any individual, agent or employee of the contractor or subcontracted personnel of any degree to render services under this Agreement where the criminal history of that individual (including any pending charges) indicate, in the school district's judgment, unfitness to perform services under this Agreement. Violation of the above by the contractor or a subcontractor thereof shall be a basis for immediate termination of this Agreement. The contractor shall require language similar to the above in all of its agreements and/or contracts with its consultants, subcontractors, suppliers and materialmen of any degree.

8. Any and all personnel of the contractor, any subcontracted personnel, and/or any suppliers thereof of any degree, assigned to regularly and continuously work under contract in any of the Owner's schools shall be required to submit a signed Conviction Disclosure Form and a legal photo identification for a background check before being allowed on the construction site. (Copy of form included at end of this Division).
9. Contractor shall submit a signed and notarized copy of the Statement Regarding Familial Relationship with his Bid Proposal. (Copy of form included in bid specification packet.)
10. Contractor shall submit a signed and notarized copy of the Affidavit of Compliance Iran Economics Sanctions Act with his Bid Proposal. (Copy of form included in bid specification packet.)

BID SUBMISSION

5.01 DEPOSIT AND OPENING OF BIDS

A. Proposals shall be submitted and delivered in opaque envelopes addressed to **Bid Location** and clearly marked **Proposal.** There shall also appear name and address of the bidder.

5.02 PREPARATION OF PROPOSALS

A. Proposals shall be prepared only on the form provided by the Architect, and all spaces left for the purpose shall be fully filled in. All designations and prices shall be fully and clearly set forth, with the amount of the bid stated in words and repeated in figures. In case of variations the worded amount shall prevail. Erasures or other changes in the bid shall bear the signature of the bidder. Proposals must be signed.

B. The bids shall be on the basis of guaranteed sum. Bidders should not add any conditions or qualifying statements, the proposal shall not contain any added recapitulation of the work to be done nor will oral, electronic or telephonic modifications of the work be considered, as otherwise the proposal may be declared irregular.

5.03 BID PROPOSAL CLARIFICATIONS

A. Bidders shall submit prices for each proposal, alternate, unit price, or other requested bid amount. Bidders may elect not to bid the Alternate prices but may jeopardize their chances of being awarded a contract. The Owner has the right to award contracts to the bidder on the basis of any combination of base bid and alternate plus ay unit prices or other bid amounts that best serves the Owner's best interest.

B. The alternate numbering system does not reflect any priority. The Owner may select and award a contract on the basis of which alternates are in their best interest.

C. In the case where several separate Base Bid Proposals are requested, the Owner may award contracts on the basis of these proposals or a combined bid, to one Contractor or several Contractors, whose bid(s) serves the Owner's best interest. If the Base Bids are an either/or selection, the Owner may choose the Proposal (Base Bid or Optional Bid) that serves their best interest.

BID ENCLOSURES/REQUIREMENTS

6.01 BID GUARANTEES

A. No proposal will be considered unless it is accompanied by the bid guarantees as stated in the official Advertisement for Bids. Guarantees may be in the form of a certified check or a standard form of bid bond by a corporate surety licensed to underwrite bids in the State of Michigan (facsimile copies are not acceptable). Guarantee shall be in the amount of five percent (5%) of the amount of the bid submitted, or in the case of separate and combined bids, five percent (5%) of the total of the separate bids. Amount shall include Base Bid plus all Alternates. Guarantees shall be drawn in favor of the Owner.

6.02 RETURN & FORFEITURE OF BID GUARANTEES

A. The bid guarantees of all except the three lowest Bidders will be returned within fifteen days after the opening of bids. The guarantees of the three lowest bidders will be returned within three days after the executed contract and bonds have been finally approved by the Owner.

B. In the event of the successful bidder refusing to enter into contract, or failing to execute the contract and bonds within ten (10) days after formal notification of award of contract, then a sum not to exceed five percent (5%) of the amount of the bid shall be forfeited to the Owner due to lack of performance and as liquidated damages.

OFFER ACCEPTANCE/REJECTION/WITHDRAW

7.01 RIGHT RESERVED BY OWNER

A. The Owner reserves the right to waive any irregularities, reject any or all bids, or accept the bid that in the opinion of the Owner will serve the best interest of the Owner. The Owner also reserves the right to reject the bid of any bidder who has previously failed to perform properly, or to complete on time contracts of a similar nature, or who is not in a position to perform the contract, or who has habitually and without just cause neglected the payment of bills or otherwise disregarded his obligations to Sub-contractors, Material Men or Employees.

B. The ability of a bidder to obtain a performance bond shall not be regarded as the sole test of such bidder's competency or responsibility.

7.02 ACCEPTANCE OF OFFER

A. After acceptance by Owner, Architect on behalf of Owner, will issue to the successful bidder, a written Notice To Proceed.

7.03 WITHDRAW OF PROPOSALS

A. Any bidder may withdraw his bid at any time prior to the hour and date specified for openings. No bidder may withdraw his proposal for **Sixty (60) days** thereafter. Negligence on the part of the bidder in preparing his bid confers no right of withdrawal or modification of his bid after such bid has been opened.

ARCHITECT'S SERVICES

8.01 ARCHITECT'S BASIC SERVICES

A. The Architect will schedule and conduct a pre-construction meeting before work starts.

B. The Architect will make job site visits on a scheduled basis (or) on a random basis, (approximately one per week), during the course of construction. He shall be provided with access to all areas of work to ensure construction is proceeding in accordance with the contract documents. The Contractor shall schedule all sample mock-ups, questions regarding the project, any special meetings for Architect's review and approval during this visit.

C. The Contractor is responsible to notify the Architect 48 hours in advance for the following special visits:
   1. First day of job set-up to review material storage placements & general layout
   2. All excavations prior to backfill or concrete placement & during testing, after demolition, but before new materials are installed, to view concealed job conditions.

3. To review/approve all samples of construction before Contractor continues with the work. Sample areas may be described in other Divisions of the Specifications - this may also include special visits by manufacturers of systems.
4. When observations/reviews/approvals are made by representatives of Manufacturers and Suppliers
5. The Contractor shall submit a notice of completion letter to the Architect in writing when all work is complete and ready for a punch list. Under the normal services, the Architect will make (1) punch list visit, (1) re-punch and (1) random final check. The initial punch list will be made by the Architect in the presence of the Contractor and the Owner to determine what items may need corrections and if the project is substantially complete. One week's advance notice is required.

   The punch list will be written up by the Architect and describe general and/or specific items in general locations. It is the Prime Contractor's responsibility to also make a list of his own, dealing with the specifics and translate them to the proper Sub-Contractors.

   If the Architect arrives at the job site and the project is not done and ready for a punch list, but rather a "to do list", the Architect has the right to leave and will only return when notice of completion is again received in writing. This process will use up (1) of the normal punch/re-punch visits.

   The first re-punch and the final random re-punch visit shall again be requested in writing, similar in format to the initial punch list.
6. The punch and re-punch list include physical items in the field requiring completion, as well as paperwork items that must be submitted prior to job "close-out" and "final completion" as noted in the General/Special Conditions. Final payment can only be considered once all items are completed to the satisfaction of the Owner/Architect.

8.02 ARCHITECT'S ADDITIONAL SERVICES

A. The contractor should review the special conditions for any applicable liquidated damages that apply for failure to meet "substantial" or "final completion" dates. In addition to these costs, or in the event that liquidated damages are not part of this contract, the contractor is responsible to reimburse the owner for the direct costs incurred for additional time by the architect, administrative/custodial staff, attorney, etc., when the project goes beyond the established dates and the cause of the delay is not beyond his control.

B. The Contractor will be responsible to pay for all additional Architectural services, including all special visits requested by the Contractor to resolve problems that are due to the lack of performance by the Contractor. Examples of certain circumstances which will cause the Contractor to incur additional Architectural service fees include, but are not limited to the following:
   1. Shop drawing submittals that are rejected due to being incomplete or for submitting on materials other than as specified and noted on the Bid Proposal Form.
   2. Contractor elects to use more than (1) Sub-Contractor for any trade that results in duplicate shop drawing submittals.
   3. Contractor requests a punch list in writing and Architect finds the work incomplete.
   4. If the Contractor fails to complete all punch list items within the (3) punch/re-punch visits allowed, the costs for all additional punch list visits will be deducted from the final cost amount due to the Contractor to cover any Architect's, Owner's, or Attorney's additional services at their regular billing rate until the work is accepted by the Architect and Owner.
   5. Contractor installs other than approved materials, resulting in additional time incurred by Architect.
   6. Contractor changes job Foreman or fails to have job Foreman present on job when visited by the Architect, which requires Architect to educate new Foreman to job status or repeat instructions.
   7. Contractor's layout or installation is found to be significantly different than the design or shop drawings and the Architect is required to review, approve, or make extensive revisions.

8. Contractor's failure to promptly correct or make good any problem that is part of this contract work and falls under the Contractor's responsibility to properly work as intended, either during the course of construction, or during the close-out period, all of which requires additional time by the Architect for reviews, observations, etc.
9. All Architect's/Engineer's time to close out the project beyond the thirty (30) days after substantial completion, including making phone calls, writing letters, reviewing documents, special close-out meetings, etc., unless a time extension has been approved with a signed change order.
10. Note: All additional time required by the Architect to resolve any of the above items will be back charged against the contract amount based on the Architect's/Engineer's current hourly rate and made payable to the Architect by the Owner. The Contractor shall be informed by the Architect within ten (10) days of any incident of any intent to invoke back-charges for additional Architectural services. It shall be the Contractor's responsibility to request in writing any estimates of additional costs to be incurred. Contractor's failure to respond to the estimate in a timely manner will be interpreted as Contractor's acceptance of all additional Architectural services for back-charges as summarized by the Architect.

END OF SECTION

Monroe Public Schools
Conviction Disclosure Form – New Employees

I UNDERSTAND THAT THE INFORMATION REQUESTED IS REQUIRED BY THE CENTRAL RECORDS DIVISION OF THE MICHIGAN STATE POLICE, LANSING, MICHIGAN. I FURTHER UNDERSTAND THAT A CONVICTION RECORD DOES NOT NECESSARILY PREVENT ACCEPTANCE OF EMPLOYMENT. I AUTHORIZE MONROE PUBLIC SCHOOLS TO UTILIZE THE ABOVE INFORMATION FOR THE PURPOSE OF OBTAINING INFORMATION REGARDING A CRIMINAL CONVICTION.

Name: _____

Last First Middle

Maiden name or names previously used: _____

Birthdate: _____ Race: _____ Sex: _____

Building: _____ Assignment: _____

Pursuant to Public Act 138 of 2005, I represent that (check all that apply):

_____ 1. I have not been convicted of, or pled guilty or nolo contendre (no contest) or am the subject of a finding of guilt by a judge or jury of any crime.

_____ 2. I have been convicted of, or pled guilty or nolo contendre (no contest) or am the subject of a finding of guilt by a judge or jury for the following crimes *(attach a separate sheet of paper to explain the criminal offense, date, court, city/state, and circumstances surrounding the conviction):*

Felony _____ Misdemeanor _____

Felony _____ Misdemeanor _____

Felony _____ Misdemeanor _____

In signing this form, I understand and agree that:

3. If I have been convicted of a listed offense, my employment shall be terminated. I also understand that if I have been convicted of a felony, other than a listed offense, the superintendent, or chief administrator and the School Board must each approve, in writing, my employment or work assignment.

4. Until the criminal history report is received and reviewed by the employing school district, I am regarded as a conditional employee and if the criminal history report is not the same as my representation(s) above, my employment contract is voided at the option of the school district.

_____ _____

Signature Date

SECTION 007400
SUPPLEMENTARY AND SPECIAL CONDITIONS

PART 1 GENERAL

1.01 CONTRACTS, BONDS AND INSURANCE

A. Contract
   1. The Architect will prepare the AIA Document A101-2017, Standard Form of Agreement Between the Owner and Contractor based on the bid amount agreed by the Owner. Successful bidders will be required to furnish bonds and insurance in accordance with the provisions of the General Conditions. Executed duplicate copies of bonds and insurance certificates will be required for each set of contract documents. On this project the Owner elects not to require “Project Management Protective Liability Insurance”.
   2. All conditions of all contract and sub-contracts for labor and material to be furnished on this work shall be as set forth in the General Conditions for Building Contracts, Form A-201-2017, latest edition of the American Institute of Architects. Where there is a difference between this project manual and Form A-201, this project manual shall govern. All Contractors and Sub-Contractors shall familiarize themselves with all conditions of this form and be bound by them. (Copies available from the AIA, www.documentsondemand.AIA.org, at cost.)

B. Guarantee Bonds:
   1. Article 11.5 of the General Conditions shall be supplemented as follows:
      a. "Prior to signing the contract, Contractor shall pay the premium for and furnish Performance Bond in the full amount of the contract price to cover faithful performance of the contract, and a Labor and Materials Bond in full amount of contract price to cover payment of all obligations arising thereunder. Bonds shall be in such form as Owner may prescribe and with such sureties as he may approve."

C. Insurances:
   1. Article II of the General Conditions shall be supplemented as follows:
      a. "Insurance shall be written for amounts as required by law or not less than the following limits of liability" for personal and property loses:

General Aggregate	= $2,000,000.00
Producst and Completed Operations Aggregate	= $2,000,000.00
Personal & Advertising Injury	= $1,000,000.00
Each Occurrence	= $1,000,000.00
Medical Expense	= $ 5,000.00
Automobile - Owned/Non-Owned	= $ 1,000,000.00

      b. The Owner shall provide and pay the premium for Owner's liability and builders risk insurance.
      c. Contractor shall provide certificates of coverage for necessary unemployment insurance, workman’s compensation, etc., as required by the State of Michigan and the Federal Government.
      d. Contractor shall provide and pay the premium to add the Owner and Architect as additional insured to the insurance coverage for this work (See this section for Hold Harmless / Indemnify). (This is to cover any claims against Owner/Architect due to Contractor's negligence.)
      e. Only Certificates of Insurance Certified using Accord Form #25-S (7-90) will be acceptable. All insurance shall be carried with companies authorized to do business in the State of Michigan and which are satisfactory to the Owner. See sample certificate at end of “Instruction to Bidders”.
      f. The insurer shall agree to notify the project Owner prior to termination, or reduction of any insurance coverage. The certificate shall include the following statement, "30 Day Notification in Case of Cancellation", and shall contain no disclaimers.

g. The Contractor shall require his Sub-Contractors who are not protected under his liability and workman's compensation insurance to purchase and maintain their own insurance of the same types and limits as is required of the Contractor.

1.02 EXAMINATION OF SITE, MEASUREMENTS & LEVELS:

A. Bidders shall visit the site of the work, compare the drawings and specifications with any work in place, and inform themselves of all conditions, including other work, if any, being performed. Failure to visit the site will in no way relieve the successful bidders from the necessity of furnishing any materials or performing any work that may be required to complete the work in accordance with the contract documents without additional cost to the Owner.

1. Each Contractor shall be responsible for the correct installation of his work to comply with the plans and specifications.

1.03 GENERAL CONTRACT

A. Local Labor & Materials - Each Contractor shall give preference to the employment of local labor and the purchase of materials locally where same are available at prices equivalent to those obtainable elsewhere.

B. Current Laws - The Contractor shall keep himself fully informed of all laws and municipal ordinances and regulations in any manner affecting those engaged or employed in the work, and all orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. He shall, at all times, observe and comply with all such current laws, ordinances, regulations, orders and decrees which are effective during the progress of the work; and shall protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violations of any such law, ordinances, regulation, order or decree, whether by himself, his Sub-contractors, or his employees.

C. Collusion - If at any time it shall be found that the person, firm, or corporation to whom the contract has been awarded has, in presenting any bid or bids, colluded with any other party or parties, then the contract so awarded shall be null and void, and the Contractor and his sureties shall be liable to the Owner for all loss or damage which the Owner may suffer thereby and the Owner may advertise anew for bids and said work.

D. Responsibility - The Contractor is primarily responsible for all work. He shall coordinate all Suppliers, Sub-Contractors, etc., that he may contract work with. He shall notify all Sub-Contractors in advance to avoid any unnecessary delays. The Contractor shall assume responsibility for the general charge and security of the building within the contract limits until it is accepted by the Owner. Contractor shall be responsible for maintenance of his work until final acceptance by Owner, and shall take such measures as necessary to ensure adequate protection of equipment and materials during delivery, storage, installation, start-up, temporary operation and shut-downs and any damage, vandalism, thievery, etc., to stored, or installed materials or any part of this construction.

E. General/Prime Contractor’s Responsibility - It is the General Contractor’s responsibility to provide and install all items specified in this contract, to assemble and collect all parts, materials, equipment, labor, etc. as required for a complete finished installation. Where these documents state, for clarification purposes that the work or item is to be completed by certain trades or Sub-contractors, (i.e. Mechanical or Electrical Contractor), it shall be referenced only to those related divisions. These specifications and drawings do not control the Contractor in dividing the work among his workers, Sub-contractors, suppliers, etc., or in establishing the extent of work to be performed by any trade.

F. Lay Out - The Contractor shall immediately locate all general reference points and take such action as is necessary to prevent their destruction; lay out his work and be responsible for all lines, elevations and measurements of buildings, grading, paving, utilities and other work executed by him under the contract. He must exercise proper precautions to verify figures shown on drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.

G. Cooperation & Courtesy - There must be complete co-operation between all Contractors, as well as between Contractor and Sub-Contractor, to insure satisfactory performance of all work. Foul language, alcoholic beverages and illegal or controlled substances/drugs will not be allowed by anyone under the control of this Contractor. Tobacco usage will also not be allowed where prohibited by law or by the Owner's wishes/policies. Courtesy must be exercised towards the owner, their staff and customers, deliverymen, etc., at all times.

H. Skilled Labor - All labor on this project shall be done by skilled mechanics, qualified and competent to perform the best grade of workmanship in the trade of work being performed, such as a Roofer shall not perform finish carpentry or drywall work in an exposed location.

Each Contractor and Sub-contractor shall provide a competent foreman at the job, who shall be responsible for taking instructions from the Architect and directing and installation of the Contractor's work.

I. Equal Opportunity - It shall be understood that the Contractor shall comply with the State Policy of Equal Employment Opportunity established by the Michigan Civil Rights Commission. The following Civil Rights Laws must be conformed to:

1. Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C., Section 2000d et seq., which prohibits discrimination on the basis of handicap in programs and activities receiving Federal financial assistance
2. Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C., Section 794, which prohibits discrimination on the basis of handicap in programs and activities receiving Federal financial assistance.
3. Title IX of the Education Amendments of 1972, as amended, 20 U.S.C., Section 1681 et seq., which prohibits discrimination on the basis of sex in education programs and activities receiving Federal financial assistance.
4. The Age Discrimination Act of 1976, as amended, 42 U.S.C., Section 6101 et seq., which prohibits discrimination on the basis of age in programs or activities receiving Federal financial assistance.

J. Hold Harmless/ Indemnify Clause - The Contractor agrees to comply with all laws and regulations applicable to the work to be performed and will indemnify, defend and save harmless the Owner and Architect and said property from damage which may arise as a result of the work performed and list each on certificates of insurance as additional insured, if Project Management Protective Liability Insurance is not provided.

K. Shop Drawings & Data Sheets - Submit shop drawings per 013000 - Administrative Requirements for review by the Architect. A copy of all shop drawings shall be kept at the job site by the Contractor. The Contractor shall review and stamp approved, note changes, etc.,before submitting to the Architect.

Shop drawings are not contract documents. Their purpose is to demonstrate the way the Contractor proposes to conform with the information given on the Architect's drawings. Shop drawings shall be submitted on all pre-manufactured items, custom fabricated components, any individual component that fits with or into another component to form the entire assembly, or on items specifically specified in certain divisions.

The Contractor, his Sub-Contractor and Supplier shall be responsible to determine and verify all materials, field measurements and field construction data, prior to submittal to the Architect. The Architect's review is only for the limited purpose of checking conformance with information given and the design concept expressed in the contract documents. The Architect's review is not conducted for the purpose of determining the accuracy and completeness of details, such as dimensions, quantities and the assembly of specific components to work as a whole. The Architect is also not responsible for any safety precautions, construction means, methods, techniques, sequences or procedures.

It shall also be the responsibility of the Contractor, his Sub-Contractor or Supplier to work from a full set of contract documents in preparation of the shop drawings, so that each part or

component will work with those parts as furnished or fabricated by others, so that the assembled whole works together as intended.

Shop drawings shall be submitted to the Architect early enough to allow adequate ordering, fabricating and delivery to the job site. Once received by the Architect the shop drawings will be returned to the Contractor in a timely manner. For estimating purposes and fitting into the job progress construction schedule, the following estimates of time may be used: Engineered reviewed drawings - 14 days; in-house Architectural reviewed drawings 7-10 days. Failure by the Contractor to submit enough in advance to the Architect in no way relieves the Contractor from completing the work in the time frame specified. The Contractor relieves the Architect of all responsibility and liability should he proceed with construction, fabrication or delivery of the specified part(s) without obtaining the Architect's review first.

Data sheets, manufacturer's specifications, picture cuts, etc., shall be submitted for all materials proposed to be used in this contract. All materials shall be asbestos free, 100%. No use of any materials, glues, sealants, gaskets, etc., containing any trace of asbestos shall be used on this project. Data Sheets shall clearly state the product's composition, or that no asbestos is used.

All finish materials and/or their adhesives for securing to substrates, shall meet the A.D.A. (American Disability Act), as passed July 1990 and revised September 15, 2010 to regards to elimination of toxic/allergic chemical contamination via direct vapors/fumes, or when in contact with normal spilled materials and cleaning agents.

Submit at the beginning of the project an index sheet listing all proposed shop drawings to be submitted.

L. As-Builts - The Contractor shall keep an accurate record of all deviations from the contract drawings and specifications. He shall neatly and correctly enter in pencil any deviations on the drawings affected and shall keep drawings available for inspection. Extra set of transparencies will be furnished for this purpose. Submit As-Builts per 013000 - Administrative Requirements and 017000 - Execution and Closeout Requirements for review by the Architect.

M. Manuals & Brochures - The Contractor shall submit per 013000 - Administrative Requirements and 017000 - Execution and Closeout Requirements to the Architect at completion, maintenance manuals, instructions, parts, etc., of all items installed as part of this work. Include all warranties, application for extended warranties, etc. These items shall be submitted as shop drawings.

N. Debris - All rubbish resulting from the work herein specified shall be removed from the premises as fast as it accumulates.

1.04 DEFECTIVE WORK & GUARANTEE:

A. The Contractor shall maintain his work in good condition, and repair at his own expense any work or material which proves to be defective within one (1) year from the time of final payment. A specific time can be determined towards the end of job, but it is estimated as approximately thirty days after substantial completion. This shall not be construed to cover misuse or abuse. Submit the guarantee in writing to the Architect upon completion. Specific material, equipment, or special trade warranties and guarantees as noted in these specifications shall also be submitted in writing. All warranties shall be written using the format and language as in sample warranty listed at the end of this section. Included, but not limited to, shall be the following:
   1. All Sub-contractors shall submit a signed written warranty same as the general contractor.
   2. All warranties shall be addressed to the Owner, on Company’s letterhead.
   3. All equipment warranties shall start from date of project substantial completion in the phases noted – not the dates the equipment was installed or started up.
   4. All work under this contract, in addition to the roof, shall be watertight and leak proof throughout at every point, and in every area, for a period of (1) year from date of final payment, except where leaks can be attributed to damage caused by external forces beyond the Contractor’s control. The Contractor shall immediately, upon written notification by the Owner, respond to the site to determine the source of water penetration and if found to be caused from faulty materials/workmanship resulting from this contract,

repair or replace the item(s) or do any other work necessary to make watertight at his own expense.

5. Contractor shall also, at his own expense, repair or replace, or reimburse the Owner for any damaged materials, finishes, and furnishings/contents damaged as a result of this water penetration, in order to return the premises back to the same condition prior to the water penetration.
6. In addition to the warranties as stated in this manual, the Contractor shall comply with all other warranties referred to in any portions of the contract documents or otherwise provided by law or in equity, and where warranties are in conflict, the more stringent requirement shall govern.

B. Neither the final certificate nor payment shall relieve the Contractor of responsibility for lack of conformance to the contract documents, lessening the quality of specified work or scope, errors, negligence, faulty materials or faulty workmanship within this contract, the period provided by law at the location of this project, or any special equipment/material warranties.

C. The Contractor shall bear the cost of correcting mistakes, which by a reasonable check he could have avoided.

D. The Contractor shall promptly remove from the premises all materials, whether worked or un-worked and take down and remove all portions of contract work demanded by the Architect or his representative as failing to conform to the contract.

E. The Contractor shall promptly replace and re-execute the work in accordance with the contract and shall bear expense of same, together with the expense involved in making good all work of other Contractors destroyed or damaged by each removal or replacement. If the Architect deems it expedient to accept work injured or not done in accordance with the contract, the difference in value, making a full allowance for damage, shall be deducted from the contract sum if acceptable to the Owner.

F. Each Sub-Contractor shall warrant that all work installed by his company, including that movable or adjustable, shall remain in good working order and agrees to remedy and correct and place in proper operating condition all such found not in good working order during the period of warranty unless such work has been abused or neglected by the Owner.

1.05 DEFINITIONS:

A. Architect - Shall be interpreted to mean **Kohler Architecture, Inc.**, or his authorized representative.

B. Contractor - Shall be interpreted to mean the Prime Contractor who has a direct contract with the Owner. (assumed General Contractor)

C. Owner - Shall be interpreted to mean **Monroe Public Schools**

D. Sub-contractor - Shall be interpreted to mean any person or entity who has a direct contract with the Prime Contractor, either supplying labor or materials.

The Prime Contractor shall employ only (1) Sub-Contractor/Supplier for each trade/category of work for the entire contract, or in the case of multiple building/sites, (1) Sub-Contractor/Supplier in each trade/category for all sites/buildings. This improves coordination and project scheduling, reduces shop drawing and payroll reviews, and standardizes materials and installation.

E. Substantial Completion - Shall be defined to mean when the Architect establishes in writing, based on his knowledge, observations and beliefs, that all necessary components are installed for the project to be acceptable for the Owner's intended use and beneficial occupancy, including the Contractor obtaining governing agency approvals (City, Township, County, and/or State) on all permits issued on this project. The project must meet substantial completion no later than the date established elsewhere, unless amended by change order.

F. Final Completion - Shall be defined to mean when all work, including completion of all punch list items, paper work has been submitted (guarantees, final waivers, as-builts, etc.) and the Architect approves the Contractor's final certificate for payment.

1.06 SPECIAL CLARIFICATIONS:

A. Manufacturer's Specifications - All materials, items, equipment, etc., shall be installed in accordance with the manufacturer's specifications and recommendations when not otherwise specified. These specifications do not replace or override any installation manuals/directions. The installer shall provide all materials and perform all work that is needed for this application, whether specialized to this installation or not, as required and/or recommended by the manufacturer so as not to void any warranties and functions properly so that each component becomes part of the entire assembly.

B. Where a material or installation is specified in these specifications and is in conflict with manufacturer's recommendations, the Contractor shall immediately notify the Architect before proceeding with the work. Failure to do so will place full responsibility upon the Contractor performing the work.

C. Methods of Construction - The Contractor takes full responsibility and liability for the means and methods of construction to perform the work under this contract. The timing, scheduling and skill of workers and suppliers shall be coordinated prior to beginning any work. The type of equipment, installation, sequence, temporary provisions, etc., all as required to produce the finished product for a first-class installation shall be determined by the Prime Contractor. Any delays, errors, omissions or any other problems caused to the job by a change in Sub-contractors or suppliers, bad scheduling, lack of supervision, material deliveries, etc., shall be borne by the Prime Contractor.

D. Changes - These drawings and specifications are provided to give the Contractor an understanding of the systems and materials to be installed under this contract. Where the scope of work or details are in conflict with job conditions, the manufacturer's specifications, manufacturer's guarantee, etc., they shall be modified as required by the Contractor. The Architect shall be notified prior to any change. When these details exceed the manufacturer's requirements and the guarantee, no change shall be made, unless so directed by the Owner or Architect, and the work shall be performed in strict accordance to these drawings and specifications.

   When a change is initiated either by the Owner, Contractor or Architect, the Contractor shall submit a cost breakdown of the change for approval by the Architect and Owner, before proceeding with the work. Any change in completion date shall also be documented. A formal Change Order, signed by the Owner, Contractor and the Architect will follow to authorize the work to be done and the contract amount and/or completion date to be changed. A Change Order must be fully executed before including on pay requests.

E. To insure the intent of the contract documents are being complied with and since the Architect is not providing full time inspection/observation services, the Contractor shall perform the following:
   1. On all demolitions, removals, excavations or existing concealed conditions, the Contractor shall certify that conditions found were as anticipated, or as specified in the contract documents. If the above conditions are closed-up, covered, or back-filled prior to notifying the Architect or prior to his scheduled inspection, the Contractor shall document with photos, measurements and/or sketches how the concealed conditions were constructed.
   2. Should the Contractor become aware of any deviations, unusual circumstances, cause for extra work, or other reasons he feels may have an effect, or cost change on this contract, he shall immediately notify the Architect for directions.
   3. Contractor's failure to notify the Architect/Owner, prior to performing the additional work, accepts full responsibility for any extra costs, delays or non-acceptance by the Owner or Architect that may be produced or incurred to the contract.

F. Discrepancies - Should the contract documents disagree (drawings and specifications), the better quality or larger quantity of materials or work shall be included in the bid and unless otherwise ordered in writing, shall be furnished by the Contractor.

G. Standard Codes - Reference made to standard specifications or codes refer to latest edition unless otherwise noted. Such reference includes current addenda and errata, if any. All work shall meet or exceed all zoning and code requirements, including the current Michigan Building Code, or as adopted by the local building authority, and State Fire Marshal.

H. Organization - The organization of the specifications into Divisions, Sections and Articles, and the arrangement of drawings shall not control the Contractor in dividing the work among Sub-contractors or in establishing the extent of work to be performed by any trade.

I. Materials - Shall be new. Seconds or damaged materials will be rejected by the Architect, who reserves the right to disapprove and reject any materials proposed or installed, which in his opinion fail to meet quality standards specified. Contractor shall, at his expense, remove and replace with approved materials, any rejected materials.

J. Labor - As noted elsewhere, it is the Prime Contractor's responsibility to keep the job moving according to the progress schedule and meet completion dates specified or stated in the Bid Proposal. Whether Workers/Sub-Contractors/Suppliers are union or non-union, default, quit, fail to perform, it is the Prime Contractor's responsibility to work out problems that may occur to keep on schedule and prevent any damages, delays, or disturbances caused to the Owner and/or job site.

1.07 DAMAGE & REPAIRS TO SITE & BUILDING:

A. The site, building and furniture or equipment, including such items as walls, ceilings, floors, roofs, trees, drives, walks, curbs, gutters, paving, grade areas, etc., cut up or damaged during construction of this project shall be repaired or replaced in a neat and workmanlike manner, to the satisfaction of the Owner and Architect, by the Contractor responsible.

B. The Contractor shall be responsible for the security, water tightness and systems operation of the building in areas of this work. Any vandalism, water damage, theft, electrical/mechanical damages, etc., to the building or its components or any stored or installed materials as part of this work, or furniture and equipment (ceilings, floors, walls, desks, computers, books, papers, etc.) shall become the Contractor's responsibility to restore (replace or repair) all items to their same condition as when the work started. Included, but not limited to, shall be all additional costs for Architects, Attorneys and Owner's staff time to clean up, document and resolve any damages or issues.

1.08 PROGRESS PAYMENT:

A. Owner shall make payments on account, upon issuance of certificates of payment by the Architect, for labor and materials incorporated in the work and for materials suitably stored at the site, up to ninety percent (90%) of the value thereof. Properly documented invoices shall be submitted for all stored materials. Pay requests shall reflect only the work stored or completed at date of submittal to the Architect. No projections of cost for anticipated work beyond the submittal date will be allowed.

B. Payments shall stop at 90% of the total contract, until project is SUBSTANTIALLY COMPLETE (Owner's use) and until governing agency (Governing Building Authority) has given approval. (See Substantial Completion definition in Section 1.1D-5)

C. Final payment will be made when the work is FULLY PERFORMED and FINAL COMPLETION is achieved.

D. Certain specialty construction projects are subject to other payment conditions, such as re-roofing, re-paving, etc. (see Special Payment Conditions at end of this Division, if applicable).

E. Also see Instructions to Bidders for any other requirements.

1.09 LABOR RATES

A. State Funded Projects

1. On all State projects or state funded projects, the contractor shall abide by the minimum wage rates, employment standards, occupational classifications, etc., as issued by the

State of Michigan, Department of Labor and Economic Oppurtunity, Wage and Hour Division.

1.10 TIME OF COMMENCING & COMPLETION:

A. Contractor, upon award of contract, shall begin immediately to order materials so work can begin with no delays in material deliveries.

B. All auxiliary Sub-contractors (Electrical, Carpentry, etc.) performing work under this contract at same time that Contractor is doing work, are obligated to commence, carry on, co-ordinate and complete their work in the various stages, so that the whole job will be accomplished in a scheduled manner and so that the Prime Contractor will be able to complete his work within completion time fixed.

C. To assure that all materials are placed on order and their delivery to site does not cause any unnecessary delays, the Prime Contractor shall submit transmittals, or copies of purchase orders, confirmations from the Sub-Contractor or the Supplier, along with delivery dates to the Architect for his records. This information shall all be submitted at same time, along with a weekly bar graph progress schedule, as prepared by the Prime Contractor. All schedules, purchase orders, etc., shall be submitted and approved by the Architect before any contract work begins.

D. For purposes of determining the date that contract may be awarded and for ordering materials, and submittal of shop drawings, the date of **March 24, 2026** shall be used.

E. Physical Work shall begin as soon as weather permits starting **06-15-2026** so that the completion date is achieved. On site storage of materials before this date will only be allowed in a locked trailer at Contractor's expense and with Owner's advanced approval.

F. All work on this project shall be "**Substantially Completed**" on or before **08-14-2026, at 5:00 P.M.**, or sooner as stated in the bid proposal by the bidder. See this Division regarding Liquidated Damages. All work, including punch lists, paper work, etc., as described for receiving final payment and termed "Final Completion" shall occur within thirty (30) consecutive days after the "Substantial Completion" date. (See Liquidated Damages Section for damages should dates not be met.)

G. The above dates/schedules are based on current delivery of equipment, estimated man-hours, and anticipated weather conditions for the scope of work. Contractors shall verify availability of all materials during the bidding process and list on the bid proposal the manufacturers of equipment that will not conform to this schedule. Should the equipment manufacturers as specified, not fit the anticipated schedule, list other equal equipment in area provided on bid proposal for substitutions, along with any cost changes for the Owner's consideration

1.11 HAZARDOUS MATERIAL:

A. If any Contractor during the course of construction, or work, observes the existence of asbestos, lead base paint, P.C.B., or other hazardous materials in the structure or building, or in area of work, the Contractor shall promptly notify the Owner. The Owner shall consult with their environmental consultant regarding removal or encapsulation of the questioned material. The Contractor shall not perform any work pertinent to the hazardous material prior to receipt of special instructions from the Owner. Any work involved with hazardous material removal, handling, etc., shall NOT be part of this Contract or any Field Orders relating to this Contract.

B. On this particular job and in the area of work, or related area that may be affected due to this work, certain hazardous materials may exist and if known will be properly identified or made known to the Contractor by the Owner. It is the Contractor's responsibility to exercise care in performing all operations of this work to not disturb or affect these materials, either directly, or in-directly (such as water damage, materials dropped, etc.). If an incident should occur, the Contractor shall immediately notify the Owner and his insurance company and safeguard the area. The Owner will make an inspection and advise of all procedures to be implemented. It is the Owner's responsibilities to contact their hazardous material consultant and perform all work to test, remedy and enclose the situation, all at the Contractor's expense. The cost will be

deducted from the contract amount, or the Contractor's insurance company will reimburse the Owner directly.

C. The Architect shall have no responsibility for the discovery, presence, handling, removal, or disposal of, or exposure of persons to asbestos and hazardous materials in any form for the project.

D. The Contractor shall inform himself of the presence of asbestos/hazardous materials which may be present in the buildings by reviewing the Owner's copy of the A.H.E.R.A. Management Act (Asbestos Hazards Emergency Response Act), which is available in each building, or by contacting the Owner.

E. The Contractor shall be responsible to inform all workers of all known hazardous materials present at the job site prior to starting any work and instruct each worker on the proper safeguards required, so as not to disrupt any encapsulated or contained hazardous materials.

1.12 SALVAGEABLE ITEMS:

A. All existing items called for to be removed, or are abandoned, or are in the way of this new work, shall be completely removed and disposed of offsite at a licensed disposal facility by this Contractor unless noted differently.

B. See related Divisions - 024100 - Demolition and Patching, Mechanical and Electrical Divisions.

1.13 LIQUIDATED DAMAGES & COMPLETION OF WORK:

A. It is hereby understood and mutually agreed, between the Contractor and the Owner that the date of completion, as specified in the Proposal, is an essential condition of this Contract, and that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and prevailing industrial conditions.

B. If the Contractor shall fail, neglect or refuse to **SUBSTANTIALLY COMPLETE** the work within the time herein specified, or within any proper extension thereof granted by the Owner, the Contractor does hereby agree, as a part of the consideration for awarding this contract, to pay to the Owner the amount specified herein as Class A liquidated damages for each and every calendar day that the Contractor shall be in default after the time stipulated for SUBSTANTIAL COMPLETION of the work. The amount of Class A liquidated damages shall be deducted from the estimated amounts coming due and payable to the Contractor at the rate of **$1,000** per day, after the date as specified in the special conditions for SUBSTANTIAL COMPLETION.

C. If the Contractor shall neglect, fail, or refuse to obtain **FINAL COMPLETION** of the contract and final acceptance of the project by the Owner within the time herein specified, or with any proper extension thereof granted by the Owner, then the Contractor does hereby agree, a part of the consideration for awarding this contract, to pay to the Owner the amount specified in the proposal as Class B liquidated damages for each and every calendar day that the Contractor shall be in default after the time stipulated for FINAL COMPLETION and acceptance of the project by the Owner. The amount of Class B liquidated damages shall be deducted from the estimated amounts coming due and payable to the Contractor at the rate of **$100** per day, after the date as stated in the special conditions for FINAL COMPLETION and acceptance of the project by the Owner.

D. In the case where the contract includes work at several sites/buildings, the Class A and Class B liquidated damages noted above will apply to each site/building not completed.

E. The Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault due to unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including but not restricted to acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and severe weather.

F. Request for the extension of time for completion beyond the completion date noted in the Invitation to Bid may be requested in writing of the Owner by the Contractor. Such request to be

considered must show reasons beyond the control of the Contractor. All requests shall be submitted within five (5) days of when problem becomes known to the Contractor.

1.14 TEMPORARY FACILITIES:

A. Enclosures - Contractor is responsible for any damage to all materials, stored or built into this work under this contract, due to elements of the weather, vandalism, theft, fire, etc. No open areas of work shall be left open during non-working hours or inclement weather. Contractor is responsible for all damages caused due to this contract, to all materials, whether existing or incorporated into this work.

B. Storage - Each Contractor shall erect a materials storage shed, properly covered, locked, etc., as required. Contractor is responsible for stored materials. Stolen, damaged or destroyed materials shall be replaced at the Contractor's expense. No inside of building storage of materials is allowed before the date noted herein as start of physical work. No inside storage is allowed after construction starts unless it is in the area of work governed by this contract and is under the Contractor's full control and contract limits.

C. Field Office - None Required

D. Toilet Facilities - Workmen will be allowed to use existing facilities. Contractor shall be responsible for maintaining and keeping areas clean.

E. Miscellaneous - Contractor shall provide all temporary drainage, drains, sumps, walkways, railings, etc., as required for proper execution of work and as required to meet all codes and ordinances.

F. Debris Removal - All debris resulting from this work shall be cleaned up at end of each day’s work and hauled away from job upon completion to a licensed disposal site. Prime Contractor shall provide a dumpster as required for use by all Sub-Contractors and pay for all usage/dump charges.

G. Removal - Temporary facilities shall be removed when no longer required, or at completion and site restored to original condition.

H. Exits - Provide temporary ladders, railings, etc., as required for emergency use during construction. Proper exiting of building shall be maintained at all times.

I. Temporary Heat - Contractor shall provide and maintain all temporary heating and ventilating units during construction as required to properly execute this contract. All fuels used shall be paid for by the Contractor. (No electric units)

J. Barricades - Provide all necessary barricades, fencing, flagmen, etc., to properly control and assure the safety of workers and the public during this work.

K. Water - The Prime Contractor shall make suitable connections as required to perform the work. Water to be available at site as provided by the Owner.

L. Electrical - The Contractor shall make suitable connections as required to perform the work. Electricity will be available on the site as furnished and paid for by the Owner. See Electrical Division for other requirements.

M. Telephones - Contractor can use on-site pay telephones if available. Contractor is not to use Owner's general telephones.

N. Fencing - Prime Contractor is to secure the contract limits of this work with snow type fencing or better as needed to secure the construction site off limits to unauthorized people. Safety to staff, students and public is of utmost importance. All ladders, scaffolding, doors, windows, entries, and other attractive/inviting items, shall be secured during non-working hours.

O. Temporary Fire Barriers - In student occupied buildings, temporary fire rated doors/barriers are to be installed when the students are scheduled to occupy the building and construction is not complete.

P. Road Maintenance - Contractor shall keep the Owner's roads free of construction spillages and debris at all times. Repair damage caused to these roads by contract-related construction vehicles by replacing damaged pavement and curbing to match existing construction.

Construct and maintain temporary earth ramps for access and egress of heavy construction and delivery vehicles to below grade (excavated) areas of the construction site.

Q. Parking - Contractor may use designated areas of Owner's parking facilities for passenger vehicles only. Heavy construction equipment will not be permitted on Owner's parking facilities. Maintain and repair any damage caused by use of Owner's parking facilities. Maintain parking area for construction vehicles as designated by the Owner.

1.15 OWNER'S WORK & SCHEDULES:

A. Owner shall be responsible for removing his equipment and materials from the contract area in sufficient time before the Contractor's work is to begin.

B. Contractor shall assume that the site and building will be occupied by staff/students during the time of construction. Precautions concerning the safety of occupants shall be exercised at all times.

C. The Owner reserves the right to award contracts for the work on the same project, or perform work with own personnel. Complete cooperation shall exist between all parties.

D. Unavoidable shutdowns for purposes of extension of existing utilities (water, electric, etc.), or installation of temporary or permanent work shall be scheduled 48 hours in advance and at the convenience of the Owner during off-use hours.

E. The Owner reserves the right to make emergency repairs, as required to keep equipment in operation without voiding the Contractor's guarantee bond, nor relieving the Contractor of his responsibilities during the bonding period.

F. Since students and staff will be occupying the site and building, specific areas for Contractor parking, storage, building access, etc., must be coordinated with Owner. Contractor shall install snow type fences to secure these and construction areas.

G. Hours of work by this Contractor/Sub-Contractor(s) shall occur between 7:30 A.M. to 4:00 P.M., Monday through Friday. The Owner will be responsible to have the building and site open and closed at times so noted.

H. Should the Contractor desire times other than those listed above for interior work, the Contractor shall submit a written request to the Owner for consideration and approval forty-eight (48) hours in advance, in order to change the scheduling of their custodial staff and the opening/closing of the building(s)/sites(s). Should this special request be granted by the Owner, the Contractor shall accept and pay the additional costs incurred by the Owner at the rate of $60 per opening and $60 per closing of the building/site. This cost will be treated as a Change Order and deducted from the contract cost.

1.16 MISCELLANEOUS COSTS:

A. The Prime Contractor shall secure and pay for the building permit from the Governing Building Authority, based on the work of all Contractors, along with all costs for inspections, plan review fees, approvals, etc. Sub-contractors shall secure same related permits as required by code. Upon completion, submit all occupancy permits, approvals, etc. It is the Prime Contractor's responsibility to pick up all costs and coordinate the Sub-permits, should the Sub-Contractors under his control fail to do so. All permits, including electrical/mechanical, shall be secured from the State of Michigan. Contact the Michigan Department of Licensing and Regulatory Affairs, Bureau of Construction Codes and Fire Safety, Plan Review Division, P.O. Box 30255, Lansing, MI 48909 (517-241-9328).

B. The Prime Contractor shall retain the services of an Approved Third-Party Agency to perform all Special Inspections and Testing as required by the Governing Building Code, Governing Building Authority, or as called out in the construction documents. Notify Owner / Architect, immediately, of any failed tests or inspections and provide Owner with all written reports and

test results at project completion. See “Special Inspections” in the Governing Building Code for requirements.

C. Contractor, Sub-Contractor and Supplier shall include in his bid and contract price any Michigan sales and use taxes, currently imposed by legislative enactment.

D. Electric - the Electrical Contractor shall be responsible and include all power company's back-charge and utility company's work in the bid for all secondary and primary wiring, poles, transformers, meter, meter socket, etc. For either temporary or final service the Prime Contractor shall be responsible for all usage bills, until acceptance by the Owner, or substantial completion.

E. Electrical Contractor to be responsible for labor and materials for final hook-up of all electrical equipment as supplied under Electrical Division, Mechanical Division, or Equipment Division as furnished by Prime Contractor, unless noted otherwise in specific Divisions, such as overhead door operators. Included are kitchen appliances, lights, fans, motors, etc.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

* SAMPLE *

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): DATE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Agent: Name, Address, Phone Number, Contact Person	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: List Company for each Coverage	
INSURER B:	
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

INSURED
Contractor: Name, Address, Phone Number, Contact Person

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC			List #	List Dates →		EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ 2,000,000
								$
	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS			List #	→		COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB OCCUR **EXCESS LIAB** CLAIMS-MADE DED RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		List #	→		WC STATU-TORY LIMITS OTH-ER	
							E.L. EACH ACCIDENT	$
							E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
	Installation Floater Business Risk			List #	→		Site Amt — stored Transit — or install Total	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Owner + Architect as additional insured with respect to General Liability.

→ List actual names (add any attachments)

CERTIFICATE HOLDER

Owner: Name
Mailing Address

NOT Job or Architect

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Signature of Agent

ACORD 25 (2010/05)

* SAMPLE *

Project Name
Client

Type on contractor's letterhead with complete address, phone numbers, federal and state ID#

LETTER OF WARRANTY

Re: List here Owner's name and project description as listed on Architect's Project Manual

Date:

We hereby warrant that the work, described as _____, which we have completed at the above mentioned project, has been done in strict accordance with the drawings and specifications and that the work installed will fulfill the requirements of those specifications. We agree to repair or replace or cause to be repaired or replace any or all of work which may prove to be defective in workmanship or materials, together with any adjacent work which requires repair or replacement because of our defective work, within a period of _____ year(s) from date of Certificate of Occupancy or date of final payment by the Owner, whichever is later, ordinary wear and tear and unusual abuse or neglect excepted.

If we fail to commence to comply with the above paragraph within 10 days after receipt of written notice from the Owner to do so or fail to pursue such compliance with diligence, we, jointly and severally, do hereby authorize the Owner to proceed to have the defects repaired and made good at our sole expense, and we will honor and pay the costs and charges for it together with interest at the maximum rate permitted by law upon demand. If we fail to fulfill the preceding obligations, and if the Owner brings an action to enforce this warranty, we agree to pay the Owner's reasonable architect's, attorneys and staff fees incurred in connection therewith.

This guarantee does not limit the requirements for liability and responsibility as covered by the State of Michigan Statute of Limitations, or equipment and manufactured items, which have extended warranties.

_____

Signed

_____

Printed Name / Title

List bonding company, address, phone number, as well as the local bonding agent with same information.

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

The proposal shall be based ONLY upon the furnishing of all materials and/or equipment and accessories as specified by manufacturer or trade names throughout the various specification headings. Where the phrase "approved substitute" and/or "approved equal" appears, the Contractor may, if he desires, request approval from the Owner and Architect. The acceptance of such substitutes, which the Architect and Owner believe to be in the Owner's best interests, will be made prior to bid opening. If no such substitutions are accepted at that time, the Contractor shall furnish only those materials and/or equipment specifically named. Contractor shall submit all pertinent data, manufacturer's specifications, picture cuts, etc., as required by the Architect/Owner for proper evaluation.

1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
    a. Unavailability.
    b. Regulatory changes.
2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
5. Waives claims for additional costs or time extension that may subsequently become apparent.
6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    a. Project Information:

1) Official project name and number, and any additional required identifiers established in Contract Documents.
2) Owner's, Architect's, and Contractor's names.

b. Substitution Request Information:
1) Indication of whether the substitution is for cause or convenience.
2) Issue date.
3) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
4) Description of Substitution.
5) Reason why the specified item cannot be provided.
6) Differences between proposed substitution and specified item.
7) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
1) Physical characteristics.
2) In-service performance.
3) Expected durability.
4) Visual effect.
5) Warranties.
6) Other salient features and requirements.
7) Include, as appropriate or requested, the following types of documentation:
(a) Product Data:
(b) Samples.
(c) Certificates, test, reports or similar qualification data.
(d) Drawings, when required to show impact on adjacent construction elements.

d. Impact of Substitution:
1) Savings to Owner for accepting substitution.
2) Change to Contract Time due to accepting substitution.

D. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
1. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

B. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:
a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.

b. Other construction by Owner.
c. Other unanticipated project considerations.

C. Substitutions will not be considered under one or more of the following circumstances:
1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.
1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Electronic document submittal.
C. Preconstruction meeting.
D. Progress meetings.
E. Construction progress schedule.
F. Daily Construction Reports
G. Progress photographs.
H. Submittals for payment.
I.
J. Worker's Qualification Submittals.
K. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 016000 - Product Requirements: General product requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via email.
    1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
    2. It is Contractor's responsibility to submit documents in allowable format.
    3. Contractor, Subcontractors, Suppliers, Owner, Architect, Architect's consultants, and any others who are part of the Electronic Document Submittal process are to follow this process.
    4. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com).
    5. Paper document transmittals will not be reviewed.
    6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
B. Cost: Any cost for this submital process is to be covered by each user.

3.02 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award to review all schedules, purchase orders, and details of the work. This must be done before any physical work begins - estimated

time is 2-3 weeks after contract award. Invited to attend are the Prime Contractors, Owner's Representatives and the Architect/Engineer. Also, the Contractor shall have present, his Foreman, or Superintendent who will be in charge of the job and any Sub-Contractors that are deemed major contributions to the work.

B. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Designation of personnel representing the parties to Contract.
   5. Contractor to have the following information for distribution at this meeting:
      a. Progress Schedule - Weekly bar graph of the anticipated progress of work.
      b. List of all Suppliers, Sub-Contractors, with phone numbers and addresses.
      c. Schedule of Payment Values
      d. List of all shop drawings to be submitted. Include spec data sheets, color samples, picture cuts, samples, etc. (See Shop Drawing Schedule at end of Instructions to Bidders.)
      e. Copies of purchase orders and written confirmation from Supplier/Sub-Contractor.
      f. Permit applications, or copies of permits, or submit a written letter to the Architect with date, inspector's name and phone number from the Governing Building Authority stating that permits will not be required.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

C. Architect will record minutes and distribute copies within two days after meeting to participants, Contractor, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum weekly intervals.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's superintendent.
   5. Major subcontractors.

C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of RFIs log and status of responses.
   7. Review of off-site fabrication and delivery schedules.
   8. Maintenance of progress schedule.
   9. Corrective measures to regain projected schedules.
   10. Planned progress during succeeding work period.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule and coordination.
   13. Other business relating to work.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.05 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. In addition to transmitting electronically at daily interval to Owner and Architect, submit electronically with pay app at monthly intervals.
   1. Field reports may be handwritten, scanned, and sent in .pdf format; or from electronic project management software (i.e. Raken, FieldLens, or others).

C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
   1. Date.
   2. High and low temperatures, and general weather conditions.
   3. List of subcontractors at Project site.
   4. List of separate contractors at Project site.
   5. Approximate count of personnel at Project site.
      a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
   6. Material deliveries.
   7. Safety, environmental, or industrial relations incidents.
   8. Meetings and significant decisions.
   9. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
   10. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
   11. Testing and/or inspections performed.
   12. List of verbal instruction given by Owner and/or Architect.
   13. Signature of Contractor's authorized representative.
   14. Progress Photographs

3.06 PROGRESS PHOTOGRAPHS

A. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.

B. Photography Type: Digital; electronic files.

C. In addition to periodic, recurring views, take photographs of each of the following events:
   1. Completion of site clearing.
   2. Excavations in progress.
   3. Foundations in progress and upon completion.
   4. Structural framing in progress and upon completion.
   5. Enclosure of building, upon completion.
   6. Final completion, minimum of ten (10) photos.

D. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
   4. Photo CD(s): Provide 1 copy including all photos cumulative to date and PDF file(s), with files organized in separate folders by submittal date.

3.07 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
   2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 016000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.

5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Highlight items requiring priority or expedited response.
4. Highlight items for which a timely response has not been received to date.

H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.08 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
1. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
2. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.10 PAY REQUEST SUBMITALS

A. Contractor shall file electronic (.pdf) applications for monthly payment installments with the Architect in accordance with the requirements of the General Conditions if a 100% Performance/Labor and Material Bond is a part of this contract. Otherwise no payment shall be made until completion of the work.

B. Submitted with the first application for payment, the Contractor shall file with the Architect, for his approval, a schedule of values for the various parts of the work aggregating the contract sum. Schedule shall be in such form and in sufficient detail to facilitate issuance of certificates of payment. Schedule shall become the basis for payments and shall accompany all remaining applications for payments.

C. Pay Request Submittals - Must be submitted to the Architect (1) week before it goes to Owner. Owner needs (20) days for processing and issuing check. Note any special dates that request for payments must be received by Owner. Otherwise dates will be established at the pre-construction meeting.
   1. AIA Form G-702, signed and notarized.
   2. AIA Form G-703, complete with line item breakdowns for General Conditions, Architectural Trades, Mechanical, Electrical, etc.
   3. Waiver of Lien from Contractor, each Sub-Contractor, each Major Material Supplier for preceding pay request.
   4. Contractors Sworn statement. (See sample Statement at the end of this section. This sample statement is available from architect in electronic format. Any other Sworn statement form shall include, at least, the column information shown on sample.)
   5. Labor/Payroll Forms from Contractor and each Sub-Contractor listing each Worker’s name, address, social security number, trade classification, rate of pay, hours and week worked. HUD Form WH 347, or Certified Payroll Form is acceptable. Must be signed. This is applicable only if a State Prevailing Wage or Federal Wage Rate Project.
   6. Daily Field Reports since previous pay application.
   7. Progress Photographs since previous pay application.

D. Final Pay Request shall include the above items, plus the following items:
   1. Final Waivers of Lien from Contractor, all Sub-Contractors, all Major Material Suppliers
   2. Contractor's Affidavit of Payment of Debts and Claims, AIA Form G706
   3. Consent of Surety Company to Final Payment, AIA Form G707
   4. Contractor's written Warranty per 007400 - Supplementary and Special Conditions from the date of Final Payment.
   5. All written Warranties per Section 007400 - Supplementary and Special Conditions of Specifications from Manufacturer's Components/Systems, as noted in other Divisions of these Specifications.
   6. "As-Built" Drawings, showing any changes from bidding drawings. Including “site survey” verifying all grades, dimensioning locations of all U.G. valves, clean-outs, taps, etc. per requirements listed elsewhere.
   7. Final Approval Certificates from the Governing Building Officials on all Construction Permits obtained, and/or required.

8. Copies of all Maintenance Manuals/Procedures from the Manufacturers of all Pre-Manufactured Components/Systems, plus (1) complete set of all Shop Drawings for project.
9. List containing all Sub-Contractors, their Suppliers and related products with names, address, contact person and phone numbers.

E. Architect's Action - Architect will acknowledge receipt, review each submittal, and process one of the following ways: Process with owner copying contractor, Hold and notify contractor of items needing correction, Reject and notify contractor of reason(s), or take other appropriate action.

3.11 WORKER'S QUALIFICATION SUBMITTALS

A. Must be submitted electronicaly within two (2) weeks after receiving notice to proceed. This includes Prime Contractor and all major Sub-Contractors.
1. List with each worker's name, address, social security number, trade classification, years of trade experience and years employed by Contractor. See other Divisions of these specifications that may set ratios of apprentices to journeymen.
2. Conviction Disclosure Form, (copy attached at the end of this Division) and a copy of their driver’s license or legal photo I.D. for each worker on the construction site with the name and signature of each worker.

B. Architect's Action - Architect will acknowledge receipt, review each submittal, and process one of the following ways: Process with owner copying contractor, Hold and notify contractor of items needing correction, Reject and notify contractor of reason(s), or take other appropriate action.

END OF SECTION

Name of Project _____ Date: _____
Project Address _____
Client _____
Client Address _____
Arch. Project # _____

SWORN STATEMENT

STATE OF MICHIGAN) SS:
COUNTY OF _____)

_____, *[name of person swearing statement]*, being duly sworn, states the following:

_____ *[name of contractor]* is the contractor for an improvement to the following real property in _____ County, Michigan, described as follows: *[Give the legal description of the property.]*

The following is a statement of each subcontractor, supplier and laborer for whom payment of wages or fringe benefits and withholdings is due but unpaid with whom the contractor has contracted for performance under the contract with the owner or lessee, and the amounts due to the persons as of the date of this statement are correctly and fully set forth opposite their names:

Name, Address & Phone No. of Subcontractor, Supplier or Laborer	Type of Improvement Furnished	Total Contract Price	Change Orders	Adjusted Contract Price	Subcontractor Paid to Date	Current Request	Retainage	Balance to Complete
TOTALS:								

[NOTE: It is not necessary to list any materials furnished by the contractor / subcontractor out of his/her own inventory, and which have not been purchased specifically for performing the contract.]

The contractor has not procured materials from, or subcontracted with, any person other than those set forth above, and owes no money for the improvement other than the sums set forth above.

I make this statement as the contractor or as _____ *[capacity]* of the contractor to represent to the owner or lessee of the property and his/her agents that the property is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth in this statement and except for claims of construction liens by laborers that may be provided under Section 109 of the Construction Lien Act, 1980 PA 497, MCL 570.1109.

Name of Project _____
Project Address _____
Client _____
Client Address _____
Arch. Project # _____

Date: _____

SWORN STATEMENT

WARNING TO OWNER OR LESSEE: AN OWNER OR LESSEE OF THE PROPERTY MAY NOT RELY ON THIS SWORN STATEMENT TO AVOID THE CLAIM OF A SUBCONTRACTOR, SUPPLIER OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR A LABORER WHO MAY PROVIDE A NOTICE OF FURNISHING UNDER SECTION 109 OF THE CONSTRUCTION LIEN ACT, 1980 PA 497, MCL 570.1109 TO THE DESIGNEE OR TO THE OWNER OR LESSEE IF THE DESIGNEE IS NOT NAMED OR HAS DIED.

IF THIS SWORN STATEMENT IS IN REGARD TO A RESIDENTIAL STRUCTURE, ON RECEIPT OF THIS SWORN STATEMENT, THE OWNER OR LESSEE, OR THE OWNER'S OR LESSEE'S DESIGNEE MUST GIVE NOTICE OF ITS RECEIPT, EITHER IN WRITING, OR BY TELEPHONE, OR PERSONALLY, TO EACH SUBCONTRACTOR, SUPPLIER, AND LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING UNDER SECTION 109 OR, IF A NOTICE OF FURNISHING IS EXCUSED UNDER SECTION 108 OR 108A, TO EACH SUBCONTRACTOR, SUPPLIER, AND LABORER NAMED IN THE SWORN STATEMENT. IF A SUBCONTRACTOR, SUPPLIER, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR WHO IS NAMED IN THE SWORN STATEMENT MAKES A REQUEST, THE OWNER, LESSEE, OR DESIGNEE SHALL PROVIDE THE REQUESTER A COPY OF THE SWORN STATEMENT WITHIN 10 BUSINESS DAYS AFTER RECEIVING THE REQUEST.

_____ _____

Signature of Deponent Print Name

WARNING TO DEPONENT: A PERSON WHO GIVES A FALSE SWORN STATEMENT WITH INTENT TO DEFRAUD IS SUBJECT TO CRIMINAL PENALTIES AS PROVIDED IN SECTION 110 OF THE CONSTRUCTION LIEN ACT, 1980 PA 497, MCL 570.1110.

Subscribed and sworn to before me this _____ day of _____, 20_____.

_____

Notary Public, _____ County, _____State
Print Name: _____
My Commission Expires: _____

Name of Project _____
Project Address _____
Client _____
Client Address _____
Arch. Project # _____

Date: _____

SWORN STATEMENT

570.1110 Sworn statement by contractor or subcontractor; contents; form; notice of receipt; withholding from contractor or subcontractor amount due subcontractors, suppliers, laborers, or lien claimants; direct payments to lien claimants; notice; itemized statement; reliance on sworn statement to avoid claim; failure of contractor or subcontractor to provide sworn statement to owner or lessee prior to recording claim of lien; giving false sworn statement to owner or lessee as crime; total amount; prior convictions; prohibited use.

Sec. 110.

(1) A contractor shall provide a sworn statement to the owner or lessee in each of the following circumstances:

(a) When payment is due to the contractor from the owner or lessee or when the contractor requests payment from the owner or lessee.

(b) When a demand for the sworn statement has been made by or on behalf of the owner or lessee.

(2) A subcontractor shall provide a sworn statement to the owner or lessee when a demand for the sworn statement has been made by or on behalf of the owner or lessee and, if applicable, the owner or lessee has complied with the requirements of subsection (6).

(3) A subcontractor shall provide a sworn statement to the contractor when payment is due to the subcontractor from the contractor or when the subcontractor requests payment from the contractor.

(4) A sworn statement shall list each subcontractor and supplier with whom the person issuing the sworn statement has contracted relative to the improvement to the real property. The sworn statement shall contain a list of laborers with whom the person issuing the sworn statement has contracted relative to the improvement to the real property and for whom payment for wages or fringe benefits and withholdings are due but unpaid and the itemized amount of such wages or fringe benefits and withholdings.

(5) The contractor or subcontractor is not required to list in the sworn statement material furnished by the contractor or subcontractor out of his or her own inventory that was not purchased specifically for performing the contract.

(6) On receipt of a sworn statement regarding an improvement to a residential structure, the owner, lessee, or designee shall give notice of its receipt, either in writing, by telephone, or personally, to each subcontractor, supplier, and laborer who has provided a notice of furnishing under section 109 or, if a notice of furnishing is excused under section 108 or 108a, to each subcontractor, supplier, and laborer named in the sworn statement. If a subcontractor, supplier, or laborer entitled to notice under this subsection requests a copy of the sworn statement, the owner, lessee, or designee shall provide the requester a copy within 10 business days after receiving the request.

(7) After the contractor or subcontractor provides the sworn statement, the owner or lessee may withhold or, upon written demand from the contractor, shall withhold from the amount due or to become due to the contractor or to the subcontractor for work already performed an amount sufficient to pay all sums due to subcontractors, suppliers, or laborers, as shown by the sworn statement, or due to lien claimants who have provided a notice of furnishing under section 109. From the amount withheld, the owner or lessee may directly pay subcontractors, suppliers, or laborers the amount they are due as shown by the sworn statement. If the contract provides for payments by the owner to the general contractor in the normal course of construction, but the owner elects to pay lien claimants directly under this section, the first time the owner elects to make payment directly to a lien claimant, he or she shall provide at least 5 business days' notice to the general contractor of the intention to make direct payment. Subsequent direct disbursements to lien claimants need not be preceded by the 5-day notice provided in this section unless the owner first returns to the practice of paying all sums to the general contractor. As between the owner or lessee and the contractor or subcontractor, all payments made under this subsection are considered the same as if paid directly to the contractor or subcontractor. If an amount is withheld under this subsection from the contractor or subcontractor, the owner or lessee, upon request, shall prepare and provide to the contractor or subcontractor an itemized statement of the sums withheld. If an amount is paid directly to a lien claimant under this section, the owner or lessee shall, if requested by the contractor or subcontractor, provide to the contractor or subcontractor an itemized statement of the sums paid.

(8) An owner, lessee, designee, mortgagee, or contractor may rely on a sworn statement prepared by a party other than himself or herself to avoid the claim of a subcontractor, supplier, or laborer unless the subcontractor, supplier, or laborer has provided a notice of furnishing as required under section 109 or unless the notice of furnishing is excused under section 108 or 108a.

(9) If a contractor fails to provide a sworn statement to the owner or lessee before recording the contractor's claim of lien, the contractor's construction lien is not invalid. However, the contractor is not entitled to any payment, and a complaint, cross-claim, or counterclaim may not be filed to enforce the construction lien, until the sworn statement has been provided.

Name of Project _____
Project Address _____
Client _____
Client Address _____
Arch. Project # _____

Date: _____

SWORN STATEMENT

(10) If a subcontractor fails to provide a sworn statement under subsection (2) to the owner or lessee before recording the subcontractor's claim of lien, the subcontractor's construction lien is valid. However, a complaint, cross-claim, or counterclaim may not be filed to enforce the construction lien until the sworn statement has been provided.

(11) A contractor or subcontractor who desires to draw money and gives or causes to be given to any owner or lessee a sworn statement required by this section that is false, with intent to defraud, is guilty of a crime as follows:

a) If the statement involved is for less than $200.00, the contractor or subcontractor is guilty of a misdemeanor punishable by imprisonment for not more than 93 days or a fine of not more than $500.00 or 3 times the statement amount, whichever is greater, or both imprisonment and a fine.

(b) If any of the following apply, the contractor or subcontractor is guilty of a misdemeanor punishable by imprisonment for not more than 1 year or a fine of not more than $2,000.00 or 3 times the statement amount, whichever is greater, or both imprisonment and a fine:

(i) The statement involved is for $200.00 or more but less than $1,000.00.

(ii) The statement involved is for less than $200.00 and the contractor or subcontractor has 1 or more prior convictions for committing or attempting to commit an offense under this act.

(c) If any of the following apply, the contractor or subcontractor is guilty of a felony punishable by imprisonment for not more than 5 years or a fine of not more than $10,000.00 or 3 times the statement amount, whichever is greater, or both imprisonment and a fine:

(i) The statement involved is for $1,000.00 or more but less than $20,000.00.

(ii) The statement involved is for more than $200.00 but less than $1,000.00 and the contractor or subcontractor has 1 or more prior convictions for violating or attempting to violate this act. For purposes of this subparagraph, however, a prior conviction does not include a conviction for a violation or attempted violation described in subdivision (a) or (b)(ii).

(d) If any of the following apply, the contractor or subcontractor is guilty of a felony punishable by imprisonment for not more than 10 years or a fine of not more than $15,000.00 or 3 times the statement amount, whichever is greater, or both imprisonment and a fine:

(i) The statement involved is for $20,000.00 or more.

(ii) The statement involved is for $1,000.00 or more but less than $20,000.00 and the contractor or subcontractor has 2 or more prior convictions for committing or attempting to commit an offense under this act. For purposes of this subparagraph, however, a prior conviction does not include a conviction for a violation or attempted violation described in subdivision (a) or (b)(ii).

(12) For purposes of subsection (11), statements involved in separate incidents pursuant to a scheme or course of conduct within any 12-month period may be aggregated to determine the total amount involved in the statements.

(13) If the prosecuting attorney intends to seek an enhanced sentence for a violation under this section based upon the defendant having 1 or more prior convictions, the prosecuting attorney shall include in the complaint and information a statement listing the prior conviction or convictions. The existence of the defendant's prior conviction or convictions shall be determined by the court, without a jury, at sentencing or at a separate hearing for that purpose before sentencing. The existence of a prior conviction may be established by any evidence relevant for that purpose, including, but not limited to, 1 or more of the following:

(a) A copy of the judgment of conviction.

(b) A transcript of a prior trial, plea-taking, or sentencing.

(c) Information contained in a presentence report.

(d) The defendant's statement.

(14) If the sentence for a conviction under this section is enhanced by 1 or more convictions, those prior convictions shall not be used to further enhance the sentence for the conviction pursuant to section 10, 11, or 12 of chapter IX of the code of criminal procedure, 1927 PA 175, MCL 769.10, 769.11, and 769.12.

CONTRACTOR'S DAILY FIELD REPORT

DATE COPIED TO ARCHITECT _____

(INCLUDE ENTIRE ACTIVITIES PER DAY)

CONTRACTOR: _____ FIELD REPORT NUMBER: _____

PROJECT: _____ ARCHITECT'S PROJECT NUMBER _____

DATE:_____ TIME _____ TEMP RANGE: _____ WORK HOURS:____A.M. TO ____ P.M.

PERCENT COMPLETE:_____ CONFORMANCE WITH SCHEDULE (+,-) _____

CREW (LIST SUBS, NUMBER OF WORKERS & TRADE CLASSIFICATIONS)

MATERIAL DELIVERIES / REMOVALS:

SITE VISITORS:

HEAVY EQUIPMENT OR SPECIAL EQUPMENT USED:

WORK PERFORMED:

ITEMS TO VERIFY:

INFORMATION OR ACTION REQUIRED:

ATTACHMENTS:

REPORTED BY: _____ PAGE _____ OF _____ PAGES

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Controls: Barriers and enclosures.

B. Waste removal facilities and services.

1.02 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.03 INTERIOR ENCLOSURES

A. Protect all areas adjacent to construction AND common points of travel to and from construction areas. Protection in these areas to include air quality, walk surfaces, equipment, furnishings, building occupants, etc. from dust / debris, excessive noise, wear, or damage of any kind. Prior to any physical work, the contractor must have a written plan for protection approved by the architect.

B. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

C. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

1.04 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Re-use of existing products.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See Section 011000 for list of items required to be salvaged for reuse and relocation.
   2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Containing lead, cadmium, or asbestos.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Furnish min. 5% replacement stock materials for all non-painted ceiling, flooring, and wall coverings installed as part of this work.

C. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 012500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.

1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

F. For exterior storage of fabricated products, place on sloped supports above ground.

G. Provide off-site storage and protection when site does not permit on-site storage or protection.

H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

I. Comply with manufacturer's warranty conditions, if any.

J. Do not store products directly on the ground.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

M. Prevent contact with material that may cause corrosion, discoloration, or staining.

N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Storage of Materials

H. Starting of systems and equipment.

I. Demonstration and instruction of Owner personnel.

J. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.

B. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.

C. Section 078400 - Firestopping.

D. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that 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.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.
   1. Minimum of 5 years of documented experience.

B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1.07 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

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 clean-up of work of separate sections.

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.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.

5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. The Prime Contractor shall be responsible for coordinating all cutting and patching of built work that needs to be modified for missed items, errors, defects, etc., as caused by his own Employees or Sub-contractors. He shall coordinate with related trades and Sub-Contractors and work out all details and scheduling. The Prime Contractor shall coordinate with the responsible party for the problem and extra work and shall resolve all costs to correct, without additional charge to the Owner.

B. Whenever possible, execute the work by methods that avoid cutting or patching.

C. See Alterations article above for additional requirements.

D. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

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.

H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

K. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. On a daily basis, all rubbish and debris shall be cleaned up and placed in a dumpster on the job site to be removed/replaced as needed to a licensed disposal site. The building site shall be kept neat and organized, so that work and safety of all trades is not affected. Submit written documentation, manifests, logs, etc. of all debris removal at completion of job.

B. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

C. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

D. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

E. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose off-site; do not burn or bury.

F. It shall be the Prime Contractor's responsibility to clean-up and co-ordinate work areas so that each trade can perform their work safely and efficiently or direct and enforce that each Sub-Contractor conforms to these same requirements.

G. Should the Contractor fail to clean-up debris caused from his operations and properly store and remove from site on a daily basis, the Owner in a safety/emergency situation without notice to the Contractor may elect to clean up debris with their own work force. At other times the Owner will give Contractor advance notice. All costs incurred by the Owner due to Contractor's neglect will be documented and deducted against the final contract amount due to the Contractor.

3.09 STORAGE OF MATERIALS

A. Materials used as part of this work shall be neatly stored and properly protected in an organized manner, so they do not interfere with the work, safety of all trades and hazard or damage to the site/building. Vandalism arising from improperly stored materials to the Owner's site/building shall be borne by the Contractor.

3.10 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.11 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.12 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.13 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.14 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

I. If this contract involves construction of a new building, remodeling, or additions the scope of clean up shall be more than the normal removal of rubbish and leaving the work areas clean. The Contractor shall clean all new work, wash floors, vacuum carpet, wash glass, remove all stickers, replace broken glass, remove stains, spots, marks, dust and dirt from all decorated work and finishes, including all existing areas affected by this operation, including tenants furnishings, contents and personal belongings. All damage to lawns, walks, pavement, vehicles or other operations in performing this work shall be repaired or replaced to an equal, or better condition than before the damage occurred. The project shall be ready for Owner's occupancy and use when completed.

3.15 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 024100
DEMOLITION AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Site Plan: Indicate:
   1. Areas for temporary construction and field offices.
   2. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
   1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
   2. Demolition firm qualifications.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

A. All demolition workmanship shall be of first quality, performed by skilled workers with items carefully removed to not damage existing work that remains or to be built upon/modified by other trades. The Demolition Contractor or workers shall be knowledgeable of the systems and materials they are removing. Coordinate all demolition work with the Sub-Contractors that will be required to repair, extend, modify, alter, etc., the item or items involved. Where possible, the actual trade performing the re-construction shall perform the demolition.

PART 3 EXECUTION

2.01 DEMOLITION

A. Work included consists of, but is not limited to the following:
   1. Selective removal of roofing, decking, structure, ceilings, walls, slabs, floor finishes, joints, masonry, misc. equipment, doors/frames, etc., as detailed or required for new work and/or maintenance repairs.
   2. See related mechanical, electrical, and plumbing specifications for other items.
   3. Where necessary or specified, saw cut, core drill, etc., certain areas to prevent un-necessary destruction of the existing work, which may otherwise require extra re-building to return to original or acceptable condition as existed before starting new work.
   4. Miscellaneous finishes as required for new work.
   5. All other work as indicated on the drawings.

B. Remove other items indicated, for salvage, relocation, and recycling.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Protect existing structures and other elements to remain in place and not removed.
   1. Design, install, and maintain formwork, falsework, shoring, reshoring, bracing and other temporary systems required to support construction loads and to maintain stability during construction. Engage the services of professional engineer licensed in state of project to design such temporary systems.
   2. When it is necessary to cut openings in existing concrete members, slabs, or masonry, locate existing prestressing tendons, reinforcing bars, and embedments, by x-ray, electromagnetic, or ultrasonic testing or by chipping. Do not cut or damage prestressing tendons and minimize cutting of other reinforcing bars and embedments. Notify Architect of existing reinforcing bars and embedments which will be cut by openings.
   3. Prevent movement or settlement of adjacent structures.
   4. Stop work immediately if adjacent structures appear to be in danger.
   5. It is the contractor’s responsibility to exercise proper care to protect all surroundings (air quality, furnishings, building, occupants, etc.) during all phases of construction. Certain areas with high replacement costs, containing occupants, still under warranty, and/or easily damaged should have added protection features. An example would be "flat" roofs and gymnasium floors and any walking surface to remain being covered using protective boards to prevent puncturing, denting, surface scratching, and wear. Prior to any physical work, the contractor must have a written plan for protection approved by the architect.

E. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

2.03 SALVAGEABLE MATERIALS

A. Where noted in Special Conditions, or herein, or other related Divisions or in the drawings, including mechanical and electrical, carefully remove certain items and store on job site in mutually agreed upon areas for Owner to pick-up and remove.

B. Any salvageable items as requested to become the property of the Owner, and the Contractor feels the item will be destroyed in the removal process, or is not cost effective to carefully removed, shall be stated as such in the Bid Proposal. Also any item or items scheduled to be turned over to the Owner, which the Contractor feels has substantial salvageable value and wishes to retain, he may elect to submit a credit for Owner's consideration on the Bid Proposal.

C. Contractor shall verify and coordinate salvageable material selection with the Owner prior to removal from the job site.

D. Salvageable items to turn over to the owner incude but are not limited to:
   1. Items as noted on the plans.

E. Special Note - Wherever contractor removes ceiling tile, it shall be saved until the end of job for blending into the existing ceilings as needed at other areas / work throughout the building. At the end of project, the owner has the option of keeping the salvaged tile or having contractor haul off at his expense.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
   1. Verify construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

D. Remove existing work as indicated and required to accomplish new work.
   1. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure. Provide shoring and bracing as required.
   2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch to match new work.

2.05 PATCHING

A. Where certain items are called for to be replaced, removed, repaired, altered, etc., and the work involves the removal/destruction of adjacent or related existing items, those damaged items shall be patched, repaired, replaced to their original or better condition as existed before the work is started. A typical example would be regarding new door/frame replacement in same wall. Included as part of the work is any wall damage caused by the removal of door/frame and the installation of the new - including finishes.

B. Where not shown on drawings, all patching, painting, etc. shall be done with similar materials or an approved substitute to the surrounding areas or as specified in other related Divisions and as recommended by manufacturer. If the Contractor is in question, consult the Architect prior to removal or replacement. All materials shall be carefully removed to avoid damage to other work not scheduled for demolition or for turning over to the Owner.

C. All patching work shall be uniform in appearance, flush, same texture, etc. with the adjacent existing work. In certain instances, to achieve this, additional adjacent work may be necessary to remove and replace. Typical examples would be:

D. Any patch painting shall be done in geometric configurations, stopping at logical break points, such as inside or outside corners, at change of materials, or as directed by Owner/Architect.

E. Neatly saw cut existing walls for installation of new shower panel frames. Grout all surrounding masonry solid in preparation of frame installation.

F. Where existing tile ceilings are removed during Owners asbestos abatement, and the work will be exposed, patching may be done with matching plaster of 5/8” drywall properly anchored, taped and spackled.

G. Where existing walls are removed and/or finishes are removed, the substrate material shall be cleaned, ground down, filled, leveled smooth, etc. and made ready for new finishes and/or materials as specified. Flatness tolerance shall be Class ‘A’ (1/8” deviation in 10’). Leveling shall be done with materials as manufactured by Ardex, Sika, Thoro, or equal.

2.06 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 078400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

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

1.02 RELATED REQUIREMENTS

A. Section 016000 - Product Requirements

B. Section 017000 - Execution and Closeout Requirements

1.03 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; Current Edition.

B. FM (AG) - FM Approval Guide; current edition.

C. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fire Stop Insulation – Shall be “ThermaFiber Fire Safing Insulation” unfaced, flame spread 15, smoke develop 0, as manufactured by Thermafiber Inc, Toledo, Oh. (888-834-2371) Blanket size is 4” thick x 24” x 48”.

B. Fire Stopping - One part silicone sealant equal to Dow Corning 3-6548 RTV foam, flame spread of 20 per ASTM E-84-76A or Tremco “TREMstop Fyre Sil”.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Joints deeper than 1/2" shall be built up to a depth of 3/8" below adjacent surfaces with approved compacted filler material prior to applying sealant.

C. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 016000 - Product Requirements

B. Section 017000 - Execution and Closeout Requirements

C. Section 078400 - Firestopping: Firestopping sealants.

1.03 REFERENCE STANDARDS

A. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.
6. Substrates for which laboratory adhesion and/or compatibility testing is required.
7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
8. Sample product warranty.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANTS - GENERAL

A. Colors: as selected from manufactures complete colors.

2.02 JOINT SEALANTS

A. General Exterior - One part polyurethane sealant equal to Vulkem 116, or Tremco Dymonic 100.

B. General interior - Acrylic latex paintable sealant caulking equal to Tremco #834.

C. Fire Stopping - One part silicone sealant equal to Dow Corning 3-6548 RTV foam, flame spread of 20 per ASTM E-84-76A or Tremco “TREMstop Fyre Sil”.

D. Fixtures - One part mildew resistant silicone equal to Dow Corning #786.

E. Compression Joints - one part, butyl #440 Tape, 1/16" or 1/8" by 3/8" or 1/2" wide in Grey or Black color as manufactured by Tremco.

F. Asphalt Compatible – Sealtight pointing mastic, available in 29 oz. cartridges as manufactured by W.R. Meadows.

2.03 ACCESSORIES

A. Primer - A quick drying clear primer as recommended by manufacturer shall be used where required.

B. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

C. Filler Material - Polyurethane foam rod stock, non-gassing, open-cell, equal to Tundra Foam, as manufactured by Industrial Thermo Polymers Limited, 2316 Delaware Avenue, Suite 216, Buffalo, NY 14216 (212-475-2000) and as distributed by Williams Products, Inc., Troy, MI. (248-643-6400). Size shall be such that when compacted, it equals 2/3 of its original width, or as recommended by the sealant manufacturer. Tundra foam rod stock is black (ebony) color, compatible with hot pour and cold applied sealants.

D. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

E. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Joints deeper than 1/2" shall be built up to a depth of 3/8" below adjacent surfaces with approved compacted filler material prior to applying sealant.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Sealant shall be installed in strict conformance with the manufacturer's recommendations. Compounds shall generally be applied by means of a handgun. Use special nozzles as required for hard to apply areas. Exercise extreme care to prevent smearing on adjacent surfaces. A full head of sealant shall be applied into joint under sufficient pressure

to fill all voids and joints solidly, drawing nozzle across sealant to leave a slightly concave surface.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Neatly tool joints to slightly concave surface, using tooling agent recommended by sealant manufacturer. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surfaces joined. Sealant bead shall be of width/depth and cross section as recommended by manufacturer.

I. Sealed joints shall not be touched, washed, or otherwise disturbed for 48 hours, to allow sealant to cure.

J. Final appearance of joint shall be without sags, ripples, globs and waviness. It shall be a straight, uniform sized, continuous flow of material. Work in and blend where one stroke flow ends and other begins.

K. Joints shall be caulked before painting adjacent work. Do not paint over any sealant unless allowed by manufacturer.

L. When concrete walks abutt vertical walls and aprons, the expansion joint material is to be held down ½" and sealed flush with polyurethane sealant to not pond water.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

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

END OF SECTION

SECTION 099000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Interior painting and coating systems.

C. Exterior painting and coating systems.

D. Scope:
   1. This Contractor shall paint all exterior and interior building materials as required for a finished installation or as noted on drawings.
   2. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including but not limited to the following: .
      a. Interior walls and exposed drywall ceilings.
      b. Exposed CMU walls.
      c. Interior and Exterior Electrical items not factory finished or as called out to be painted such as meter, electric disconnect/conduits/meter socket, etc. All new wire mold.
      d. Electrical / Fire Alarm Replacement and Updates - new device/junction boxes, cover plates, conduits, wire mold. Any surface exposed after work is completed, that was not exposed prior to work.
      e. Miscellaneous items as required for a finished installation.
      f. Patch Paint - any surface that was not exposed prior to this work and becomes exposed as a result of this work.
      g. Items as called out in drawings.
   3. Patch painting as called out in drawings and as required for a finished appearance.
   4. Contractor shall acquaint himself with all divisions of the specifications and drawings, as he shall paint or finish to completion all materials requiring painting or finishing which are left un-finished.

1.02 RELATED REQUIREMENTS

A. Section 016000 - Product Requirements

B. Section 017000 - Execution and Closeout Requirements

1.03 REFERENCE STANDARDS

A. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

B. SSPC-SP 2 - Hand Tool Cleaning; 2024.

C. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

D. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Product characteristics.
   2. Surface preparation instructions and recommendations.
   3. Primer requirements and finish specification.
   4. Storage and handling requirements and recommendations.
   5. Application methods.
   6. Clean-up information.

C. Samples: Submit four paper draw down samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.

D. Applicator's qualification statement.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
   3. Label each container with color in addition to manufacturer's label.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.07 FIELD CONDITIONS

A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com/#sle.

B. Comparable Products: Products of approved manufacturers will be considered in accordance with 016000 - Product Requirements, and the following:
   1. Other Acceptable Manufacturers:

2.02 PAINTINGS AND COATINGS

A. General:
   1. Provide factory-mixed coatings unless otherwise indicated.
   2. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.

B. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 PAINT SYSTEMS - INTERIOR

A. Interior Drywall – Paint Latex

1 Coat: SW ProMar 200 Zero VOC Interior Latex Primer, B28 Series (4 mil wet, 1.0 mil dry)

2 Coats: SW ProMar 200 Zero VOC Interior Latex Eg-Shel, B20 Series (4 mil wet, 1.5 mil dry)

B. Interior Wood - Paint

1 Coat: SW Prep Premium Wall and Wood Interior Latex Primer, B28 Series (4 mil wet, 1.6 mil dry)

2 Coats: SW ProMar 200 Zero VOC Interior Latex Eg-Shel, B20 Series (4 mil wet, 1.5 mil dry)

C. Interior Concrete Block/Brick - Paint
   1 Coat: SW Pro Industrial Heavy-Duty Block Filler, B42 Series (16.0-21.0 mil wet, 8.0-10.5 mil dry)
   2 Coats: SW ProMar 200 Zero VOC Interior Latex Semi-Gloss, B31 Series (4 mil wet, 1.5 mil dry)

D. Interior Ferrous Metal – Paint
   1 Coat: SW Pro Industrial Pro Cryl Universal Primer, B66 Series (5-10 mil wet, 1.8-3.6 mil dry)
   2 Coats: SW Pro Industrial Acrylic Semi-Gloss, B66 Series (6-12 mil wet, 2.1-4.2 mil dry)

E. Interior Galvanized Metal – Paint
   1 Coat: SW Pro Industrial Pro Cryl Universal Primer, B66 Series (5-10 mil wet, 1.8-3.6 mil dry)
   2 Coats: SW Pro Industrial Acrylic Semi-Gloss, B66 Series (6-12 mil wet, 2.1-4.2 mil dry)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. General - Before painting, remove hardware, accessories, plates, lighting fixtures, fire alarm devices, and other similar items, or provide ample protection of such items. Remove any clear covers or other items where the painted surface can be seen at completion. Upon completion of each space, replace above items. Use only skilled mechanics for removing and connection of above items.

B. Clean surfaces thoroughly and correct defects prior to application.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

D. Remove mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.

E. All hairline cracks, splits, gouges, scratches and alligatored surfaces shall be spackled with Durabond 90, following manufacturer's recommendations. Prime these areas with a heavy-duty primer similar to Sherwin Williams Prep Rite High Build Latex Primer, B28W601 (1-4 Mills Dry).

F. Roughen up and clean all surfaces as required by manufacturer for proper bonding of product used to the material/surface being prepped.

G. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk.
   2. Fill bug holes, air pockets, and other voids with cement patching compound.
   3. Prepare concrete according to SSPC-SP 13.

H. Masonry: Remove efflorescence and chalk.

I. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.

J. Plaster: Fill hairline cracks, small holes, and imperfections with patching plaster. Make smooth and flush with adjacent surfaces. Treat textured, soft, porous, or powdery surfaces in accordance with manufacturer's instructions.

K. Concrete Floors and Traffic Surfaces: Prepare concrete according to SSPC-SP 13.

L. Aluminum: Remove surface contamination and oil; wash with solvent according to SSPC-SP 1.

M. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

N. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

O. Wood: Remove dust, grit, and foreign matter. Scrape, sand, and spot prime knots and pitch streaks. Fill nail holes and imperfections with wood filler and sand smooth.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. All paint shall be installed in strict conformance with manufacturer's specifications. Surface to be painted shall be clean, dry, smooth and adequately protected from weather. Temperature shall be above 50 degrees F.

C. Finished work shall be uniform, of approved color, smooth and free from runs, sags, defective brushing, clogging, or excessive flooding.

D. Small cracks, holes and other imperfections in masonry surfaces, which show up after primer-sealer has been applied to the surface shall be filled with an approved spackling compound before application of second coat.

E. Paint or finish all work specified herein and all work customarily painted for appearance or protection, as well as other specified items of work scheduled to be painted in room finish schedule.

F. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

G. Regardless of number of coats specified, apply additional coats until complete uniform color, hide, and sheen is achieved.

H. Fire Alarm / PA System Replacement - any surface that is exposed after work is completed, that was not exposed prior to work, is to be patch painted to color blend into the primary adjacent surface. All wire mold or exposed conduit to be painted to match surface it is mounted to. New and existing cover plates and device/junction boxes exposed to view as part of this work to be painted the color of surface mounted to.

I. All patch painting shall be done in neat logical configurations, stopping at logical break points, such as inside or outside corners, at change of materials, or as directed by the Owner/Architect.

3.04 PRIMING

A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Primers specified in painting schedules may be omitted on items factory primed or factory finished items if acceptable to top coat manufacturers.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

DIVISIONS 26, 27 & 28
ELECTRICAL SYSTEM SPECIFICATION INDEX

SECTION 260500 - GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. A. This Division of Work shall include all labor, materials, tools, equipment and services necessary for and/or reasonably incidental to the furnishing and installation of electrical work as shown on the contract documents and specified herein, for a complete and operable installation.

B. The documents encompassed by these specifications and the attached drawings outline the work and/or materials required to furnish, install, alter, and/or expand the electrical system to provide a complete, finished and operational project. This shall include all associated cutting, patching, excavation, backfill, compaction, concrete bases, supports, auxiliary steel, inserts, anchors, chases, sleeves, etc., required to accomplish all portions of the this Work, without relying upon other trades, or the work described in other divisions of the specifications, unless it is specifically stated in Division 26 or on the Electrical Drawings, that an item will be provided by another trade. Wherever the word 'provide' is used, it shall be understood to mean: furnish and install complete and ready for proper use.

C. Work by others:
1. All electric motors for building equipment, appliances, and utility systems, will be furnished under other divisions of these specifications
2. All electric work associated with equipment control and temperature control systems, devices, and panels, including the associated raceways and conductors, shall be provided under Division 23, unless specifically noted otherwise.
3. Field painting of electrical equipment, conduit, boxes, supports, etc., other than touch-up work to repair factory finishes, will be provided by others (as specified elsewhere in these specifications).

1.02 DRAWINGS

A. The accompanying drawings are complementary to the specifications. Work indicated by either, shall be considered as being required by both. No apparent omission from the Drawings shall relieve the Contractor from providing equipment, materials, or services described by the electrical specifications or drawings.

B. The Drawings may be superseded by later revised drawings or specification addenda and the Contractor shall conform to all reasonable changes without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings but which are obviously necessary to make a complete working installation, shall be included.

C. The electrical drawings are schematic in nature. The exact location of conduits, boxes, devices, fixtures, etc., (not referenced by dimension), shall be determined in the field considering interferences, structural conditions, appearance, and the work of other trades. Minor changes in the location of electrical items, from that shown on the drawings, shall not constitute a reason for additional compensation. This contractor shall field verify dimensions

indicated by scaling the plans, since actual distances, locations and elevations will be governed by actual field conditions.

1.03 RELATED DOCUMENTS AND REFERENCES

A. The Instructions to Bidders, General Conditions, Special Conditions, Addenda, Alternates, these Technical Specifications and the Drawings together with the Contract and Proposal Form comprise the Contract Documents for the Electrical Contract.

B. Bidder shall refer to applicable portions of Division 1 – General, as many of the general requirements stated therein apply to or will affect the Electrical work and coordination between the trades is required.

C. The term Associate as used herein refers to the design team on the project including the prime Architectural or Engineering design firm responsible for the drawings.

1.04 REFERENCED CODES AND STANDARDS

A. Perform all work in accordance with the latest edition of the National Electrical Code as issued by the National Fire Protection Association International, National Electrical Safety Code, Life Safety Code, State of Ohio Building Codes, and any local codes or ordinances.

B. All work, materials and apparatus shall conform to the rules and regulations of the National Board of Fire Underwriters, to the Codes and Standards of the various National Engineering Societies applicable to the work in question, and to the following:

ACIL	American Council of Independent Laboratories
ANSI	American National Standards Institute
ASTM	American Society for Testing & Materials
AWS	American Welding Society
FM	Factory Mutual
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety & Health Administration
UL	Underwriters Laboratories, Inc.

C. The above standards are minimum requirements. When plans and/or specifications call for higher standards, the plans and/or specifications shall govern.

D. All materials shall be installed using tools, methods, means, supports, etc., as may be recommended by the material manufacturer, even if more stringent than the governing codes or regulations specified by the NEC and the State Building Code.

1.05 PERMITS AND FEES

A. All plan approvals required by any of the foregoing will be secured and paid for by the Contractor and the proper copy distributed to the Associate.

B. All Electrical Work shall be inspected by the Bureau of Construction Codes, Permit Division, P.O. Box 30255, Lansing, MI 48909 (Phone: 517-241-9313) or the local building inspection department, where certified as the Inspection Authority for this project and site.

C. Upon completion of the work, this Contractor shall furnish to the Associate certification or evidence of final approval from said Authority before final payment on contract.

D. All fees for inspection and permits shall be a part of the Contract, the cost of which shall be included in the Contractor's Bid.

1.06 QUALITY ASSURANCE

A. All material manufacturers shall be firms regularly engaged in the manufacture of products for electrical work of the sizes, types and ratings as specified, and whose products have been in satisfactory use in similar service for not less than three (3) years.

B. Contractors shall have at least ten (10) years of successful installation experience on electrical projects similar to that required for this work.

1.07 SUBMITTALS

A. Related requirements:
   1. Section 260512 “Submittal Procedures” for information and requirements on approval drawings.

B. Record Drawings
   1. Contractor shall keep in the field, and open to inspection, an accurate and current record of all deviations from Contract Drawings and Specifications. He shall neatly and correctly enter in colored marker any deviations on drawings affected. An extra set of drawings will be furnished for this purpose.
   2. On completion of the work, the record drawings shall indicate actual routing of conduit (i.e. above ceiling, in slab), location of outlets, circuit numbering for all lighting, power and receptacle circuits. Underground feeders and duct-banks shall be located by dimension to assist in future excavations. Before final approval, contractor shall certify to the accuracy of each sheet by signature thereon and deliver same to Associate.
   3. At completion of the project, the Record Drawings will be delivered to the Owner by the Contractor along with the final Instruction Manuals. Record drawings shall be delivered to the Associate within 30 days of project acceptance.
   4. All final operating and instruction manuals, record drawings, etc., shall be completed and turned over to the Associate prior to request for final payment.

C. Instruction Manual: Bind the written operating instructions, shop drawings, equipment catalog cuts and manufacturer's maintenance instructions into a hard-backed binder, so that they can be accommodated into 8 1/2" X 11" size. Provide written instructions for each system requiring operator intervention under normal and design conditions. Submit one copy to the Associate for review. Upon approval, submit three (3) copies to the Associate for delivery to the Owner. Materials shall be assembled as follows:

1. Title Page--Title of Job, Owner, Address, Date of Submittal, Name of Contractor and Name of Associate.
2. Index of all sections
3. A section listing items requiring periodic service and for proper operation, and either state the service needed or refer to the manufacturer's data in the binder that describes the proper service.
4. A section of all project shop drawings, complete with a section index.
5. A section of all material manufacturer's operating instructions, complete with a section index.
6. A list of all material (other than basic materials) and material suppliers used on the job, Contractor's purchase order numbers, supplier's name and address, for future use by the owner's maintenance personnel.
7. List of a qualified service agency or contractor for each electrical system or major electrical component that may require service.

1.08 VISITING THE SITE

A. Contractor shall examine the site and compare it with the drawings and specifications, and shall satisfy himself as to all conditions under which the work is to be performed. Failure to do so shall be deemed as acceptance of existing conditions. The contractor shall ascertain and check the location of any existing structures or equipment that may affect this work.

B. It shall be the responsibility of this Contractor to refer to any discrepancies upon examination of site and drawings to the Associate before bid due date. No allowances shall be made on his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such examination.

1.09 GUARANTEE

A. This Contractor shall guarantee his workmanship and materials for a period of one year from the date of final acceptance and leave his work in perfect order at completion. Should defects develop within the guarantee period, this Contractor shall, upon notice of same, remedy the defects and have all damages to other work or furnishings caused by the defects or the work of correcting same repaired and/or replaced at his expense, to the condition before such damage. The date of final acceptance is defined as the date of signature of the Associate on the final payment of this Contract, unless otherwise defined in the General or Special Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Unless specified otherwise, all materials shall be new and of the best quality and, if applicable, materials shall bear certification of quality. If requested, Contractor shall furnish satisfactory evidence as to the kind and quality of materials.

B. Provide all basic electrical materials including conduit, raceways, fittings, conductors, cabling, trays, boxes, supports, devices, connections, cover plates, grounding, controls,

labeling, etc., whether or not specifically shown, specified or noted, as may be required for a complete and operable installation,

2.02 STANDARDS & SUBSTITUTIONS

A. Those articles, devices, materials, forms of construction, fixtures, etc., named in the specifications to denote the kind and quality required, whether or not the words "or equal" are used, shall be known as "Standards" and all proposals shall be based on same. Where two or more "Standards" are named together, the successful bidder may furnish any one of the "Standards" named, but Contractors shall make their selections known to Associate within 30 days following award of their contract.

B. Note that "substitutions" are not permitted except under the strict guidelines of the General Conditions. In no case will a "substitution" affect determining of the lowest bid.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All work shall be done by technicians skilled in the particular trade involved and shall be of the best quality, shall be done in a neat, workmanlike manner, up to present standards and practices.

B. Installation shall be so made that its several component parts will function together as a workable system. It shall be complete with all accessories necessary for its operation and shall be left with all equipment properly adjusted and in working order.

C. Work shall be executed in conformity with best practice and so as to contribute to efficiency of operation, minimum maintenance, accessibility and sightliness.

D. All installations shall provide for efficiency of operation, ease of maintenance, efficient utilization of space, and good construction practice, in concert with all other trades and contractors. Special care shall be exercised to insure that proper equipment maintenance and normal component replacements may be accomplished after final project completion without removal of excessive unrelated items of equipment, raceways, boxes, etc.

E. The Contractor shall have in charge of the work at all times during construction a competent foreman or superintendent, experienced in the work to be installed under this division of the work and with previous experience as a foreman for the successful Contractor. Note that selection of the foreman shall be subject to the approval of the Associate and Owner.

F. Immediately correct all work that is found unacceptable by the Associate. Work shall be unacceptable where it is not in conformance with the Drawings, Specifications or normal standards of good workmanship.

3.02 COORDINATION

A. This Contractor shall review the drawings and specifications of others trades involved in the project, and shall examine the work of such, to which his work must connect, attach, align, or otherwise coordinate. This Contractor shall, in no case, connect to, attach to, cover up, or

finish work adjacent to defective or improper work, but shall notify the appropriate other contractor and the Associate, upon such circumstance.

B. The Contractor must be prepared to enter upon his work promptly and shall layout and conduct his work at all times so as not to interfere unnecessarily with the operations of the Owner or other contractors. He shall work in harmony with such other contractors and the Owner to the best interests of the job as a whole. Provide adequate and timely input to the contractor preparing "coordination drawings" where specified elsewhere. All conflicts shall be resolved in the best interest of the Owner and the successful completion of the project.

C. Contractor shall layout his work and be responsible for correct locations, elevations, and dimensions of all work executed under this contract. He shall exercise proper precautions to verify figures shown on drawings before laying out the work and shall be held responsible for any error resulting from his failure to exercise such precaution.

D. No pleas as to acts, orders, directions or supervision of the Associate or Owner shall be admitted as justification of any error or departure from the terms of the Contract, unless such order or directions are explicitly given in writing.

3.03 SCHEDULING

A. Contractor shall take special note of the construction phasing and time constraints in other portions of these specifications. It is necessary that this Contractor cooperate closely with the Associate, Owner and General Contractor as to the areas of work and coordination of the various trades, etc. It shall be the responsibility of this Contractor to carefully plan his delivery and work schedule to coincide with operation and schedule of the other Contractors.

B. This Contractor shall work closely with the General Contractor and submit a Construction Schedule to coordinate with the General Contractors Schedule prior to actual start of construction and shall outline specifically those items whose delivery or installation may cause schedule difficulties. See Division 1.

C. Exposed raceways and boxes installed after the room has been painted, shall be painted to match the room finish, at the expense of this contractor.

3.04 CLEANING AND FINISHING

A. After all tests have been completed and approved by the Associate and Owner, this Contractor shall clean all fixtures and equipment leaving everything in working order at completion of the work.

B. All tags, stickers, markings, etc., shall be removed from fixtures, conduit and equipment. All operating instructions, connections diagrams, etc., furnished with equipment shall be turned over to the Associate as part of the Operating Instruction Brochure.

C. Finally, all debris created by execution of electrical work shall be removed by this Contractor.

3.05 FIELD TESTING

A. Contractor shall conduct such tests and adjustments of equipment as required by Associate or necessary to verify performance requirements. Submit data taken during such tests to Associate. Contractor shall pay all professional engineering fees involved in required testing of equipment. Tests shall include the operation of all lights and equipment, and grounding and insulation resistance measurements on not more than ten (10) representative circuits and any others for which a technical reason exists for such testing.

B. This Contractor shall provide necessary electrical personnel and testing instruments as required or desired by the Associate to insure proper performance or load balance, etc.

C. Load Balancing: This Contractor shall furnish personnel and equipment and insure that building power, lighting, motor and appliance loads are balanced between phases of service entrances, distribution feeders and/or transformers to within ten (10) per cent under maximum load conditions. Special care shall be taken during load balance to assure that reverse rotation of motors is not caused.

D. Phasing/Rotation: All panels, switches, switchgear, motor control, etc., shall be checked and verified in the presence of the Associate for "ABC" - "CLOCKWISE" rotation in accordance with NEMA Standards and Recommendations. This includes all existing panels and switchgear being re-fed. Exercise caution that reconnections of panel feeders, etc., do not cause any motor phase rotation reversal.

E. At the completion of the project, Contractor shall verify complete Ground/Neutral separation except at the main service bonding jumper and shall clear and correct all other grounded neutrals within his scope of work. (This generally requires a power outage coordinated with the utility company).

3.06 EQUIPMENT AND SYSTEM DEMONSTRATIONS

A. All special purpose equipment, such as Standby Power Systems, Automatic Transfer Switches, Exterior Lighting Contactors and controls, etc., shall be demonstrated in the presence of the Owner and Associate, including operation of random devices, components and wiring, to verify proper operation of the finished installation.

B. System demonstrations shall be scheduled ONLY after all devices, components, etc., have been fully tested and system is in final operating condition.

END OF SECTION

SECTION 260505 - RELATED WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide work associated with the electrical installation, which is closely associated therewith, and required for a complete and operational installation. Such work may be non-electrical in nature, but shall be provided by this contractor, in order to assure coordination and installation responsibility by this contractor. Such work shall include cutting and patching, excavation and backfilling, concrete work, and other items as may be described on the plans.

B. Where final interior or exterior finishes of this related work, is to remain exposed, such finishes shall be provided via workers or subcontractors specifically trained in the work to be performed, all at the expense of this contractor.

1.02 RELATED DOCUMENTS

A. Refer to section 260500 for general requirements for the electrical work.

B. Refer to the General Trades Specification Sections for other requirements for cutting and patching.

C. Refer to the General Trades Specification Sections for requirements for field installed concrete.

PART 2 - PRODUCTS

2.01 NOT APPLICABLE

PART 3 - EXECUTION

3.01 SLEEVES, INSERTS AND OPENINGS

A. Contractor shall layout and install his work in advance of constructing floors and walls. He shall furnish and install all sleeves and openings through floors and walls required for passage of all conduits, pipes or ducts installed by him. Sleeves shall be heavy gauge galvanized sheet steel, supported and packed to prevent ingress of concrete. All necessary cutting and patching to correct improperly installed material shall be done at this Contractor's expense. No horizontal chases will be allowed. Provide all necessary inserts for support of electrical equipment.

B. All conduits, sleeves, outlet boxes, fittings, etc., shall be properly closed with fireproof materials and patched where passing through walls, floors or ceilings in accordance with NEC 300.21 for prevention of fire spread. Sealant material shall be Dow Corning RTV

Silicone Foam, UL Listed and tested for fire penetration sealing or equal by Nelson or Burndy.

C. Where conduits, cable tray, ducts, etc., pass thru walls, floors or ceilings the opening around said penetration shall be sealed against moisture and fire penetration.

3.02 FIRE PROOFING

A. Pipe or duct penetrations thru all floors, fire walls or rated ceilings shall be sealed by the E.C. to prevent spread of fire and smoke and ingress of moisture.

B. Areas around conduits or sleeves shall be filled with a dielectric, non-hardening putty as manufactured by 3M Company or expanding caulk materials such as Silicone R.T.V. Foam or equal with appropriate fire ratings.

C. Large openings in floors or masonry walls may be sealed using light weight, low density expanding mortar as made by 3M Company, or equal with appropriate fire ratings.

D. Large openings around bus ducts or cable trays where passing thru fire rated wall shall be sealed using fire seal bags stuffed into the opening. Bags shall be coated intumescent materials, flexible and conformable and shall be easily removable and re-useable for retrofit applications. Bag seals shall be as manufactured by 3M Company or Spec Seal. or equal.

E. All fire and smoke penetration seals shall be properly closed using U.L. Listed Products to match the penetration firestop system designation and all fire and smoke stop materials shall be free of asbestos, dangerous solvents, non-halogenated and shall not produce toxic fumes or smoke during exposure to fire. Fire stop shall be designed and installed to provide a minimum 2 hour rating. All fire stop materials shall be installed in strict accordance with the manufacturer’s installation instructions.

3.03 CUTTING AND PATCHING

A. Contractor shall work in advance of work of others wherever possible, eliminating all cutting and patching. Where such procedure is impossible, cutting and patching shall be done in a neat manner by various mechanics skilled in various trades involved, to the satisfaction of the Associate. No excessive cutting will be permitted, and no structural members shall be cut without consent of the Associate.

B. Contractor shall do his own cutting and patching as required to properly complete his own work. All floors, walls, ceilings, etc., shall be left in an acceptable condition. Final finishes will be by General Contractor if final finishes have not already been applied. In case final finishes have already been applied before cutting and patching by this contractor, then final finishes shall be replaced or repaired by the General Contractor but at this contractor’s expense.

C. Holes of excessive size caused by this Contractor will be repaired at this Contractor's expense, as directed by the Associate and in accordance with other applicable portions of this specification.

D. Where underfloor raceway is indicated in existing areas, this contractor shall cut existing concrete floor to proper depth to install the new metal raceway and shall patch the concrete at the new raceway. Final floor finish to be by General Contractor.

E. Penetration of metal roof deck is not permitted for hangers, supports, clamps, fasteners, etc.

3.04 MOUNTING PADS

A. All ground mounted electrical equipment shall be mounted on 4" high poured concrete pads.

B. Pads shall be complete with chamfered or rounded corners and shall provide a smooth level surface for the equipment.

C. All concrete pads shall be "sealed" before equipment is set in place.

END OF SECTION

SECTION 260506 - ELECTRICAL SITE WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish and install the exterior underground conduit, pull boxes, handholes, etc., as shown on the plans to accommodate the utility company services and exterior components as indicated.

1.02 RELATED DOCUMENTS

A. Comply with the applicable General Trades Specification Sections for specifications pertaining to excavation, backfill and other site related work.

B. See section 260533 for raceway requirements

1.03 COORDINATION

A. Underground Utilities Notification:
   1. Each Contractor(s) to whom a contract for a public improvement is awarded shall, at least two working days, excluding Saturdays, Sundays and legal holidays, prior to commencing work cause notice to be given to the utilities, in writing, by telephone or in person.
   2. Each Contractor shall alert immediately the occupants of nearby premises as to any emergency that he may create or discover on or near such premises of the underground facility any break or leak on its lines or any dent, gouge, groove or other damage.

B. Prior to digging or drilling, Contractor shall contact the Michigan Utility Notification Center (Miss Dig System (811) or 1-800-482-7171) to have known public utilities located and marked to avoid damage to existing underground utilities.

PART 2 - PRODUCTS

2.01 UNDERGROUND WARNING

A. Underground raceway warning tape shall be bright yellow or orange, 6" wide, with imprinted lettering "Caution--Buried Electric Line Below". Tape shall be laid continuously through the length of the trench. Warning tape shall be Allen "AMT" or equal.

2.02 HANDHOLES AND JUNCTION BOXES

A. Handholes shall be of non-metallic construction, mounted flush with grade, complete with heavy duty, gasketed covers, stainless steel bolts and descriptive wording molded into the cover. Small handholes for individual lighting circuits shall be nominal 12 inches by 12 inches by 12 inches with closed bottom. Larger handholes for feeders or conduits two inch

diameter and larger, shall be comprised of multiple stacking type boxes. Larger handholes shall be nominal 36 inches by 36 inches by 36 inches deep with open bottom for natural drainage.

B. Handholes shall be Quazite "PC" Series, Synertech “S” Series or equal, sized as indicated on the plans, described above or as required by the NEC per Article 314.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All new underground raceways outside the foundation walls, including telephone, electrical, lighting circuits, etc., shall be protected via plastic warning tape located 12" below grade and directly above the buried utility line.

B. Provide new handholes where indicated or required to make splices in wiring. Handholes shall be set flush with grade, atop a six inch thick compacted, crushed stone base extending three inches beyond the handhole length and width.

3.02 EXCAVATION

A. Trenches shall be opened in straight lines and bottomed out at least four inches (4") below conduits or ducts. Minimum depth of thirty (30) inches shall be maintained between top of conduit, duct or concrete envelope, and finished grade.

B. Contractor shall cut any interfering trees, remove all stumps, rocks, etc., in the line of excavation. Any shrubbery in line of excavation shall be removed with a ball of dirt and replaced at completion of excavation. Approval of the Associate shall be obtained before any tree is removed.

C. Where excavation crosses existing lawns, Contractor shall remove sod, properly store and replace sod at completion of excavation. Care shall be exercised during the work to see that no unnecessary damage is done to lawns in the storing of dirt or other construction material. Should unnecessary damage occur, in the opinion of the Associate, the Contractor shall be required to repair lawns at his own expense.

D. Where existing sidewalks, drives, and roadways must be cut, they shall be cut in straight lines, shall present a neat appearance when re-laid and shall match existing work.

3.03 BACKFILL

A. Trenches shall be backfilled to a point six inches below grade. Fill material shall be clean earth free of rocks, sticks, etc., bank run gravel or other approved granular material.

B. Fill shall be placed in six inch layers and compacted to ninety percent (90%) maximum density. Final six inches of fill in lawn or planting areas, shall be top soil free of vegetation, rocks, sticks or other unsuitable material. Top soil shall be compacted with a suitable roller or power tamper. Top soil below sod shall be thoroughly worked to a depth of six inches mixed with commercial fertilizer. Sod shall be laid evenly, tamped and watered thoroughly.

C. Backfill under roadways, drives and parking areas shall be bank run gravel or approved granular material. Backfill under building walls and/or footers shall be concrete of the same strength as walls or footers.

3.04 EXTERIOR DUCTBANKS

A. Selected underground raceways in larger sizes may be fibre or plastic duct (PVC) encased in a steel reinforced concrete envelope. Install multiple underground conduits in common trenches, with proper spacers, and other approved fittings including long radius bends, couplings, end bells, fibre to steel adapters, etc. Exercise special care to insure that joints or couplings in underground ducts are sealed to exclude water.

B. Concrete envelopes shall encase raceways with not less than three inches (3") of concrete, top, bottom and sides, and shall include a No. 4 continuous reinforcing bar at each corner. Underground concrete duct banks shall be dyed "RED" via sprinkling or mixing as a warning for future excavations.

C. Where raceways pass through concrete walls below grade, set galvanized steel conduit or sleeves, one and one half inch (1 1/2") larger than OD of conduit. Caulk both sides with oakum and wool, or otherwise adequately waterproof opening around conduit.

D. Underground raceways serving only exterior lighting units may be direct burial rated non-metallic raceways without concrete encasement.

END OF SECTION

SECTION 260512 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.02 DEFINITIONS

A. Action Submittals: Written and graphic information that require Architect/Engineer’s responsive action.

B. Informational Submittals: Written and graphic information that do not require Architect/Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.03 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect/Engineer and additional time for handling and reviewing submittals required by those corrections.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect/Engineer's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect/Engineer for Contractor's use in preparing submittals. Do not base Submittals on reproductions of the Contract Documents or standard printed data.
   1. Architect/Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
      a. Architect/Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination. Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows.Time for review shall commence on Architect/Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 14 days for review of each resubmittal.

D. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Stamp shall include project name, location, specification section, name of reviewer, date of contractor’s approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the contract documents.

E. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect/Engineer.
   3. Include the following information for processing and recording action taken:
      a. Project name and Date.
      b. Name of Architect/Engineer.
      c. Name of Contractor.
      d. Name of subcontractor.
      e. Name of supplier.
      f. Name of manufacturer.
      g. Number and title of appropriate Specification Section.
      h. Drawing number and detail references, as appropriate.
      i. Location(s) where product is to be installed, as appropriate.
      j. Other necessary identification.
   4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect/Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer will return, without review, submittals received from sources other than Contractor.

F. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
   3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineer.
   4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect/Engineer, containing the following information:

a. Project name.
b. Date.
c. Name and address of Architect/Engineer.
d. Name of Contractor.
e. Name of firm or entity that prepared submittal.
f. Names of subcontractor, manufacturer, and supplier.
g. Category and type of submittal.
h. Submittal purpose and description.
i. Specification Section number and title.
j. Specification paragraph number or drawing designation and generic name for each of multiple items.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Related physical samples submitted directly.
n. Indication of full or partial submittal.
o. Other necessary identification.
p. Remarks.

G. Options: Identify options requiring selection by Architect/Engineer.

H. Deviations: Identify deviations from the Contract Documents on submittals.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with authorization notation from Architect/Engineer's action stamp.
4. Resubmittal Limitation Requirements: The Architect/Engineer will provide time to review the original submittal and ONE resubmittal. If resubmittals are required pursuant to the first resubmittal, the Architect/Engineer’s time for these services will be paid by the Contractor. The charges for this time will be back-charged from the Contractor as a change-order through this project’s contract. These charges will be based upon the Architect/Engineering standard hourly rates (i.e. Engineer @ $125.00/hr, etc.).

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with authorization notation from Architect/Engineer's action stamp.

PART 2 PRODUCTS

2.01 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Issue electronic submittals as PDF electronic files directly to Architect/Engineer's e-mail address.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Multiple submittals for a single type of equipment are not acceptable. Submittal for a single type of equipment shall be based on one manufacturer throughout project. Multiple components intended to function together, shall be coordinated and submitted together.
   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Clearly mark, highlight, or encircle each copy of each submittal to indicate which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts and Manufacturer's product specifications.
      b. Standard color charts.
      c. Statement of compliance with specified referenced standards.
      d. Testing by recognized testing agency.
      e. Application of testing agency labels and seals.
      f. Notation of coordination requirements.
      g. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams showing factory-installed wiring.
      b. Physical weight.
      c. Dimensions.
      d. Finish.
      e. Electrical ratings: Voltage and amperage.
      f. Construction details for installation.
      g. Operating Characteristics.
      h. Capacities: KVA, temperature rise, control devices, ballast or driver data.
      i. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data in the PDF electronic file format.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
      h. Items furnished by others: The Contractor will be provided complete manufacturers detailed shop drawings, wiring and connection diagrams, for all equipment to which his work connects. It shall be this Contractor's responsibility to request such drawings in advance of the time they are needed. Work that must

be altered because of the Contractor's failure to request and obtain such shop drawings, shall be corrected without additional cost to the owner.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.
3. Submit Shop Drawings in the PDF electronic file format.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Submit product schedule in PDF electronic file format.

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

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

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

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

I. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

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

L. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

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

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

O. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

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

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT/ENGINEER'S ACTION

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

B. Action and Informational Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. Architect/Engineer’s Review Status:
    a. No Exceptions Taken
    b. Exceptions Taken As Noted
    c. Resubmit
    d. Rejected
2. Action Required of Contractor:
    a. Process
    b. Resubmit

C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B496 - Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors; 2016 (Reaffirmed 2021).

D. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers; 2005 (Reapproved 2021).

E. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation; 2018 (Reapproved 2023).

F. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 4 - Armored Cable; Current Edition, Including All Revisions.

I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

L. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

M. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

N. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.

O. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.

P. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
1. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less.
3. Metal-clad cable, Type MC, rated 600 V or less.
4. Armored cable, Type AC, rated 600 V or less.
5. Fire-alarm wire and cable.
6. Control-Circuit Conductors.
7. Connectors, splices, and terminations rated 600 V and less.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency and manufacturer's authorized service representative.

B. Field quality-control reports.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 PRODUCTS

2.01 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
1. **Okonite Company (The).**
2. **Southwire Company.**
3. **Superior Essex Inc.**

C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.

3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 or ASTM B496 for stranded conductors.

E. Conductor Insulation:
1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.
4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
5. Type THHN and Type THWN-2: Comply with UL 83.
6. Type THW and Type THW-2: Comply with NEMA WC 70/ICEA S-95-658 and UL 83.
7. Type UF: Comply with UL 83 and UL 493.
8. Type XHHW-2: Comply with UL 44.

2.02 ALUMINUM BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn aluminum current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
1. **Okonite Company (The).**
2. **Southwire Company.**
3. **Superior Essex Inc.**

C. Standards:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Aluminum, complying with ASTM B800 and ASTM B801.

E. Conductor Insulation:
1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.
4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
5. Type THHN and Type THWN-2: Comply with UL 83.
6. Type THW and Type THW-2: Comply with NEMA WC 70/ICEA S-95-658 and UL 83.
7. Type XHHW-2: Comply with UL 44.

2.03 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   1. **AFC Cable Systems; Atkore International.**
   2. **Southwire Company, LLC.**
   3. **WESCO.**
   4. **Encore Wire Corporation**
   5. **Alpha Wire; brand of Belden Inc.**
   6. **Belden Inc.**

C. Standards:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
   2. Comply with UL 1569.
   3. RoHS compliant.
   4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
   5. Where required, provide health care rated cable with redundant ground conductors in patient care areas as per NEC 517.13.

D. Circuits:
   1. Single circuit and multi-circuit with color-coded conductors.
   2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:
   1. Type TFN/THHN/THWN-2: Comply with UL 83.
   2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel or Aluminum, interlocked.

I. Jacket: PVC applied over armor.

2.04 ARMORED CABLE, TYPE AC

A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in an overall metallic sheath.

B. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   1. **AFC Cable Systems; Atkore International.**
   2. **Southwire Company, LLC.**
   3. **WESCO.**
   4. **Encore Wire Corporation**
   5. **Alpha Wire; brand of Belden Inc.**
   6. **Belden Inc.**

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Comply with UL 4.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
5. Where required, provide health care rated cable with redundant ground conductors in patient care areas as per NEC 517.13.

D. Circuits:
1. Single circuit and multi-circuit with color-coded conductors.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation: Type THHN/THWN-2. Comply with UL 83.

H. Armor: Steel or Aluminum, interlocked.

2.05 FIRE-ALARM WIRE AND CABLE

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following or per Fire Alarm manufacturer recommendations:**
1. **Allied Wire & Cable Inc.**
2. **PYROTENAX; brand of nVent Electrical plc.**
3. **Prysmian Cables and Systems; Prysmian Group North America.**
4. **Radix Wire.**
5. **Superior Essex Inc.; subsidiary of LS Corp.**
6. **West Penn Wire; brand of Belden, Inc.**

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG for analog or addressable loops; individual conductors or twisted pair not less than No. 14 for signal circuits. Other conductors size as recommended by system manufacturer.
1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

2.06 CONTROL-CIRCUIT CONDUCTORS

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   1. **Encore Wire Corporation**
   2. **General Cable; Prysmian Group North America**
   3. **Southwire Company, LLC**

B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway, Type MC, complying with UL 1569.

C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway, power-limited cable, concealed in building finishes.

D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway, power-limited cable, concealed in building finishes.

E. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.
   1. Smoke control signaling and control circuits.

2.07 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   1. **3M Electrical Products.**
   2. **Hubbell Incorporated, Power Systems.**
   3. **ABB, Electrification Products Division.**

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
   1. Material: Copper.
   2. Type: One or Two hole with standard barrels.
   3. Termination: Compression or Crimp.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. All line voltage circuits shall be stranded, copper, 600 Volt insulted: 167 degrees Fahrenheit THHN/THWN for circuits #14 AWG thru #2 AWG; 194 degrees Fahrenheit XHHW-2 for

circuits #1 AWG and larger). Conductors #3/0 AWG and larger may be stranded electrical grade standard or compact stranded aluminum conductors with 90 degrees C rated XHHW-2 insulation, properly upsized for the ampacity equivalent to the copper conductors shown; conduit shall also be upsized for aluminum conductors. Branch circuit wiring shall be #12 AWG minimum.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway, Type XHHW-2, single conductors in raceway or Type USE, single conductor in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

3.05 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.07 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to General Trades Specification Sections.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance, feeder, splices and underground branch circuit and critical equipment conductors.
2. Perform each of the following visual and electrical tests:
    a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    b. Test bolted connections for high resistance using one of the following:
        1) A low-resistance ohmmeter.
        2) Calibrated torque wrench.
        3) Thermographic survey.
    c. Inspect compression-applied connectors for correct cable match and indentation.
    d. Inspect for correct identification.
    e. Inspect cable jacket and condition.
    f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    g. Continuity test on each conductor and cable.
    h. Uniform resistance of parallel conductors.
3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each below grade splice and splices in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

D. Cables will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports to record the following:

1. The test report shall include the following:
   a. Summary of project.
   b. Description of equipment tested.
   c. Description of tests;
   d. Test data.
   e. Analysis and recommendations.
2. Test and inspection data records shall include the following minimum requirements:
   a. Identification of the testing organization.
   b. Equipment identification.
   c. Humidity, temperature and other conditions that may affect the results of the tests/calibrations.
   d. Date of inspections, tests, maintenance and/or calibrations.
   e. Identification of the testing technician.
   f. Indication of inspections, tests, maintenance and/or calibrations to be performed and recorded.
   g. Indication of expected results when calibrations are to be performed.
   h. Indication of “as-found” and “as-left” results, as applicable.
   i. Sufficient spaces to allow all results and comments to be indicated.
3. The testing organization shall furnish a copy or copies of the complete report as specified in the maintenance testing contract.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2025.

E. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 780 - Standard for the Installation of Lightning Protection Systems; 2026.

I. UL 96 - Lightning Protection Components; Current Edition, Including All Revisions.

J. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

K. UL 891 - Switchboards; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:
   1. Underground distribution grounding.

1.04 ACTION SUBMITTALS

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

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
   1. Ground rods.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in General Trades Specification Sections include the following:
      a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article:
         1) Ground rods.
      b. Instructions for periodic testing and inspection of grounding features at ground rods and grounding connections based on NETA MTS or NFPA 70B.
         1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
         2) Include recommended testing intervals.

1.07 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

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 UL 467 for grounding and bonding materials and equipment.

2.02 MANUFACTURERS

A. **Manufacturers: Subject to compliance with requirements, provide products by the following:**
   1. **ABB, Electrification Products Division.**
   2. **B-Line; a division of Eaton, Electrical Sector.**
   3. **Continental Industries; brand of Hubbell Utility Solutions; Hubbell Incorporated.**
   4. **Hoffman; brand of nVent Electrical plc.**

5. **allG Fabrication (formerly ALT).**

2.03 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
1. Solid Conductors: ASTM B3.
2. Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.04 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression or exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Conduit Hubs: Mechanical type, terminal with threaded hub.

G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt or socket set screw.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

K. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.

L. Straps: Solid copper, cast-bronze clamp or copper lugs. Rated for 600 A.

M. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

N. Water Pipe Clamps:
1. Mechanical type, two pieces with zinc-plated or stainless-steel bolts.
   a. Material: Die-cast zinc alloy.
   b. Listed for direct burial.
2. U-bolt type with malleable-iron clamp and copper ground connector or copper ground connector rated for direct burial.

2.05 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Grounding Conductors: Green-colored insulation.

C. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3.02 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.03 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Pad-Mounted Transformers and Switches: Install grounding per utility company’s standards.

3.04 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits.

3.05 FENCE GROUNDING

A. Fence Grounding: Install at maximum intervals of 100 feet except as follows:
   1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 25 feet.
      a. Gates and Other Fence Openings: Ground fence on each side of opening.
         1) Bond metal gates to gate posts.
         2) Bond across openings, with and without gates, except at openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

3.06 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
   2. Use exothermic welds for all below-grade connections.
   3. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections with the assistance of a factory-authorized service representative.

D. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal at individual ground rods. Make tests at ground rods before any conductors are connected.
    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

D. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2025.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.

F. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

G. MFMA-4 - Metal Framing Standards Publication; 2004.

H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2025.

I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

J. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

K. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.

L. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2025.

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals; 2024, with Errata (2025).

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Steel slotted support systems.

2. Aluminum slotted support systems.
3. Nonmetallic slotted support systems.
4. Conduit and cable support devices.
5. Support for conductors in vertical conduit.
6. Structural steel for fabricated supports and restraints.
7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
8. Fabricated metal equipment support assemblies.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Slotted support systems, hardware, and accessories.
      b. Clamps.
      c. Hangers.
      d. Sockets.
      e. Eye nuts.
      f. Fasteners.
      g. Anchors.
      h. Saddles.
      i. Brackets.
   2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings For fabrication and installation details for electrical hangers and support systems.
   1. Hangers. Include product data for components.
   2. Slotted support systems.
   3. Equipment supports.
   4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Piping, fittings, and supports.

B. Welding certificates.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M and AWS D1.2/D1.2M.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame Rating: Class 1.
   2. Self-extinguishing according to ASTM D635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.
   1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
      a. **Allied Tube & Conduit; Atkore International.**
      b. **B-Line; a division of Eaton, Electrical Sector.**
      c. **CADDY; brand of nVent Electrical plc.**
      d. **Flex-Strut Inc.**
      e. **ABB, Electrification Products Division.**
   2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
   3. Material for Channel, Fittings, and Accessories:
      a. Interior Locations: Painted or plain steel.
      b. Exterior Locations: Galvanized steel, Stainless steel, Type 304 or Stainless steel, Type 316.
   4. Channel Width: Selected for applicable load criteria.
   5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.
   1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
      a. **ABB, Electrification Products Division.**
      b. **Eaton**
      c. **Unistrut; Atkore International.**
   2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
   3. Channel Material: 6063-T5 aluminum alloy.
   4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
   5. Channel Width: Selected for applicable load criteria.
   6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c., in at least one surface.
1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Allied Tube & Conduit; Atkore International.**
   b. **B-line; Eaton, Electrical Sector.**
   c. **Fabco Plastics Wholesale Limited.**
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Channel Width: Selected for applicable load criteria.
4. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
5. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
6. Rated Strength: Selected to suit applicable load criteria.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
      1) **Hilti, Inc.**
      2) **MKT Fastening, LLC.**
      3) **Simpson Strong-Tie Co., Inc.**
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**

1) **B-line; Eaton, Electrical Sector.**
2) **Hilti, Inc.**
3) **MKT Fastening, LLC.**

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: All Stainless-steel springhead type.
7. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B.

2.04 Nonpenetrating Rooftop Supports for Low-Slope Roofs:

A. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
1. **Atkore International Inc; Unistrut**
2. **Eaton Corporation**
3. **Green Link, Inc**
4. **PHP Systems/Design**

B. Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring attachment to roof structure and not penetrating roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

PART 3 EXECUTION

3.01 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
2. NECA 101
3. NECA 102.
4. NECA 105.

5. NECA 111.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
1. Secure raceways and cables to these supports with either two-bolt conduit clamps, single-bolt conduit clamps or single-bolt conduit clamps using spring friction action for retention in support channel.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in General Trades Specification Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit - Aluminum (ERMC-A); 2025.

D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

I. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).

J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.

K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.

N. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

O. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

P. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

Q. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

R. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.

S. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

T. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

U. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

V. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

W. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

X. UL 651A - High Density Polyethylene (HDPE) Conduit; Current Edition, Including All Revisions.

Y. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Z. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

AA. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

BB. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

CC. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

DD. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit; Current Edition, Including All Revisions.

EE. UL 1773 - Termination Boxes; Current Edition, Including All Revisions.

FF. UL 2420 - Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.

GG. UL 2515 - Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.

HH. UL 2515A - Standard for Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.

5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.04 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.05 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.06 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Source quality-control reports.

PART 2 PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

A. Metal Conduit:
1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. GRC: Comply with ANSI C80.1 and UL 6.
3. ARC: Comply with ANSI C80.5 and UL 6A.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit or IMC.
a. Comply with NEMA RN 1.
b. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel or aluminum.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:
1. Comply with NEMA FB 1 and UL 514B.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:
   a. Material: Steel or die cast.
   b. Type: Setscrew or compression.
6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

D. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Allied Tube & Conduit; Atkore International.**
   b. **Crouse-Hinds; brand of Eaton, Electrical Sector.**
   c. **Topaz Lighting & Electric.**
   d. **Wheatland Tube; Zekelman Industries.**
   e. **ABB, Electrification Business.**
   f. **Southwire Company, LLC.**

2.02 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:
1. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Fiberglass:
   a. Comply with NEMA TC 14.
   b. Comply with UL 2515 for aboveground raceways.
   c. Comply with UL 2420 for belowground raceways.
3. ENT: Comply with NEMA TC 13 and UL 1653.
4. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
5. LFNC: Comply with UL 1660.
6. Rigid HDPE: Comply with UL 651A.
7. Continuous HDPE: Comply with UL 651A.
8. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D3485.
9. RTRC: Comply with UL 2515A and NEMA TC 14.

B. Nonmetallic Fittings:
1. Fittings, General: Listed and labeled for type of conduit, location, and use.

2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
   a. Fittings for LFNC: Comply with UL 514B.
3. Solvents and Adhesives: As recommended by conduit manufacturer.

C. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Allied Tube & Conduit; Atkore International.**
   b. **Crouse-Hinds; brand of Eaton, Electrical Sector.**
   c. **Topaz Lighting & Electric.**
   d. **Wheatland Tube; Zekelman Industries.**
   e. **ABB, Electrification Business.**
   f. **Southwire Company, LLC.**

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 3R unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Hinged type, Screw-cover type or Flanged-and-gasketed type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

E. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Allied Tube & Conduit; Atkore International.**
   b. **Crouse-Hinds; brand of Eaton, Electrical Sector.**
   c. **Topaz Lighting & Electric.**
   d. **Wheatland Tube; Zekelman Industries.**
   e. **ABB, Electrification Business.**
   f. **Southwire Company, LLC.**

2.04 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect Prime coated, ready for field painting (verify with architect prior to ordering materials).

C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

D. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.**
   b. **Wiremold; Legrand North America, LLC.**

2.05 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

C. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

D. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

E. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures: Plastic.
   3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

F. Cabinets:
   1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.
   6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **ABB, Electrification Business.**
   b. **Appleton; Emerson Electric Co., Automation Solutions.**
   c. **Arlington Industries, Inc.**
   d. **Crouse-Hinds; brand of Eaton, Electrical Sector.**
   e. **Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.**
   f. **Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.**

2.06 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:
1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC" OR “LIGHTING” or as indicated for each service.
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
7. Handholes 12 Inches Wide by 12 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.
8. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
9. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer-concrete units SCTE 77, Tier 8 structural load rating.
10. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Polymer-concrete units, SCTE 77, Tier 8 structural load rating.

C. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
a. **Armorcast Products Company.**
b. **Carson Industries LLC.**
c. **CDR Systems Corporation.**
d. **New Basis.**
e. **Quazite.**
f. **Synertech.**

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC or IMC.
2. Concealed Conduit, Aboveground: GRC or IMC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried and GRC.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC or LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
6. Elbow: Use GRC for stub-ups from underground runs and for all underground elbows on runs exceeding two-hundred feet.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed 10 feet above finished floor, Not Subject to Physical Damage: EMT.
2. Exposed 10 feet above finished floor, Not Subject to Severe Physical Damage: EMT.
3. Exposed 10 feet below finished floor and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
   d. Gymnasiums.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Elbow: Use GRC for stub-ups from underground runs and for all underground elbows on runs exceeding two-hundred feet and for all panel feeders.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel or cast-metal fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

H. Do not install nonmetallic conduit where ambient temperature exceeds 120 degrees Fahrenheit.

3.02 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches of enclosures to which attached.

L. Raceways Embedded in Slabs:
   1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
   2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
   3. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

M. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

N. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

U. Surface Raceways:
1. Install surface raceway with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

Y. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.

2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
   d. Attics: 135 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

Z. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in General Trades Specification Sections for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in General Trades Specification Sections.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in General Trades Specification Sections.
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
   a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
   b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of

60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

E. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

F. If conduits do not enter enclosure through open bottom, field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.06 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in General Trades Specification Sections.

3.07 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

B. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

C. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Round sleeves.
   2. Rectangular sleeves.
   3. Sleeve seal systems.
   4. Grout.
   5. Pourable sealants.
   6. Foam sealants.

B. Related Requirements:
   1. General Trades Specification Sections for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 PRODUCTS

2.01 ROUND SLEEVES

A. Wall Sleeves, Steel:

1. Description: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.

B. Wall Sleeves, Cast Iron:
1. Description: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

C. Pipe Sleeves, PVC:
1. Description: ASTM D1785, Schedule 40.

D. Molded Sleeves, PVC:
1. Description: With nailing flange for attaching to wooden forms.

E. Molded Sleeves, PE or PP:
1. Description: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sheet Metal Sleeves, Galvanized Steel, Round:
1. Description: Galvanized-steel sheet; thickness not less than 0.0239-inch; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.02 RECTANGULAR SLEEVES

A. Sheet Metal Sleeves, Galvanized Steel, Rectangular:
1. Description:
a. Material: Galvanized sheet steel.
b. Minimum Metal Thickness:
1) For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness must be 0.052 inch.
2) For sleeve cross-section rectangle perimeter not less than 50 inches or with one or more sides larger than 16 inches, thickness must be 0.138 inch.

2.03 SLEEVE SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.
1. Sealing Elements: EPDM or Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel, Fiber-reinforced plastic or Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.04 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

2.05 POURABLE SEALANTS

A. Description: Single-component, neutral-curing elastomeric sealants of grade indicated below.
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2.06 FOAM SEALANTS

A. Description: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 EXECUTION

3.01 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:
   1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
      a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
      b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in General Trades Specification Sections.
   2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
   3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless sleeve seal system is to be installed.
   4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
   5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

C. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:
   1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
   2. Seal space outside of sleeves with approved joint compound for wall assemblies.

D. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations:
1. Install steel or cast-iron pipe sleeves with integral waterstops. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Install sleeve during construction of floor or wall.
2. Install steel pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Grout sleeve into wall or floor opening.

3.02 INSTALLATION OF RECTANGULAR SLEEVES AND SLEEVE SEALS

A. Install sleeves in existing walls without compromising structural integrity of walls. Do not cut structural elements without reinforcing the wall to maintain the designed weight bearing and wall stiffness.

B. Install conduits and cable with no crossings within the sleeve.

C. Fill opening around conduits and cables with expanding foam without leaving voids.

D. Provide metal sheet covering at both wall surfaces and finish to match surrounding surfaces. Metal sheet must be same material as sleeve.

3.03 INSTALLATION OF SLEEVE SEAL SYSTEMS

A. Install sleeve seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

B. 29 CFR 1910.145 - Accident Prevention Signs and Tags; Current Edition.

C. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

D. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2023.

E. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.

F. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

G. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.

H. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2018.

I. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

L. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Current Edition, Including All Revisions.

M. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Labels.
   2. Bands and tubes.
   3. Tapes and stencils.
   4. Tags.
   5. Signs.
   6. Cable ties.

7. Miscellaneous identification products.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
   1. Color shall be factory applied.
   2. Colors for 208/120-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
      c. Phase C: Blue.
      d. Neutral: White

3. Colors for 240-V - 1PH Circuits:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Neutral: White
4. Colors for 240-V - 3PH Circuits:
   a. Phase A: Black.
   b. Phase B: Orange or tagged.
   c. Phase C: Red
   d. Neutral: White
5. Colors for 480/277-V Circuits:
   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral: Gray
6. Color for Equipment Grounds: Green.
7. Colors for Isolated Grounds: Green with two or more yellow stripes.

C. Raceways and Cables Carrying Circuits at More Than 600 V:
1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

D. Warning Label Colors:
1. Identify system voltage with black letters on an orange background.

E. Warning labels and signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

F. Equipment Identification Labels:
1. Black letters on a white field.
2. White letters on a red field for all Emergency and Standby power equipment.
3. Include item name, voltage and phase. All panelboard and switchboard labels shall indicate the source of supply per NEC 408.4

2.03 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.

2. Marker for Labels:
   a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
   b. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
   a. Clear 1/2 by 1 inch, with 1/8 minimum inch text for wiring device circuit number.
      1) Example: LP#
   b. 1-1/2 by 6 inches for raceway and conductors.
   c. 3-1/2 by 5 inches for equipment.
   d. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 degrees Fahrenheit. Comply with UL 224.

2.05 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white or yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:
   a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   b. Printing on tape shall be permanent and shall not be damaged by burial operations.
   c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
   a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.

b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
d. Tensile according to ASTM D882: 30 lbf (133.4 N) and 2500 psi.

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.06 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch 0.023 inch thick, color-coded for phase and voltage level, with factory screened or printed permanent designations; punched for use with self-locking cable tie fastener.

2.07 SIGNS

A. Baked-Enamel Signs:
1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:
1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.

C. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Nomial Size: 1 by 3 inches, minumum.
3. Thickness:
a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. For signs larger than 20 sq. in., 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.08 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
1. Secure tight to surface of conductor, cable, or raceway.

H. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
1. "POWER."

I. Vinyl Wraparound Labels:
1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

J. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

K. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

L. Self-Adhesive Labels:
1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1 inch- high; where two lines of text are required, use [1-3/4 inches] high.

M. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

O. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

Q. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

R. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

S. Underground Line Warning Tape:
1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where

width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

T. Metal Tags:
1. Place in a location with high visibility and accessibility.
2. Secure using plenum-rated cable ties.

U. Nonmetallic Preprinted Tags:
1. Place in a location with high visibility and accessibility.
2. Secure using plenum-rated cable ties.

V. Baked-Enamel Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1 inch- high sign; where two lines of text are required, use [1-3/4 inches] high.

W. Metal-Backed Butyrate Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1 inch- high sign; where two lines of text are required, use [1-3/4 inches] high.

X. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1 inch- high sign; where two lines of text are required, use 1-3/4 inches high.

Y. Cable Ties: General purpose, for attaching tags, except as listed below:
1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels or vinyl tape applied in bands.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
   1. "POWER."

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use either vinyl wraparound labels, self-adhesive wraparound labels, snap-around labels, snap-around color-coding bands or self-adhesive vinyl tape to identify the phase.
   1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes or self-adhesive labels with the conductor designation.

H. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

J. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

K. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

L. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

M. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
   1. Apply to exterior of door, cover, or other access.
   2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
      a. Power-transfer switches.
      b. Controls with external control power connections.

N. Operating Instruction Signs: Self-adhesive labels, Baked-enamel warning signs, Metal-backed, butyrate warning signs or Laminated acrylic or melamine plastic signs.

O. Equipment Identification Labels:
   1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
   2. Outdoor Equipment: Laminated acrylic or melamine sign.

3. Equipment to Be Labeled:
    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of engraved laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchgear.
    e. Switchboards.
    f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
    g. Emergency system boxes and enclosures.
    h. Motor-control centers.
    i. Enclosed switches.
    j. Enclosed circuit breakers.
    k. Enclosed controllers.
    l. Variable-speed controllers.
    m. Motor Starters
    n. Push-button stations.
    o. Power-transfer equipment.
    p. Contactors.
    q. Remote-controlled switches, dimmer modules, and control devices.
    r. Power-generating units.
    s. Monitoring and control equipment.
    t. Fire-alarm control panel and annunciators.

END OF SECTION

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

D. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

E. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Section Includes:
   1. Standard-grade receptacles, 125 V, 20 A.
   2. GFCI receptacles, 125 V, 20 A.
   3. Cord and plug sets.
   4. Toggle switches, 120/277 V, 20 A.
   5. Decorator-style devices, 20 A.
   6. Wall plates.

1.04 DEFINITIONS

A. AFCI: Arc-fault circuit interrupter.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.06 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 PRODUCTS

2.01 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with requirements in this Section.

F. Devices for Owner-Furnished Equipment:
1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

G. Device Color:
1. Wiring Devices Connected to Normal Power System: As selected on design documents or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Essential Electrical System: Red.

H. Wall Plate Color: Smooth high impact plastic or stainless steel in finished areas. Galvanized for unfinished areas. For plastic covers, match device color. Refer to drawings for requirements.

I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hubbell
   b. Eaton
   c. Leviton
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hubbell
   b. Eaton
   c. Leviton
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

C. Tamper-Resistant Duplex Receptacles, 125 V, 20 A :
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hubbell
   b. Eaton
   c. Leviton
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

2.03 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hubbell
   b. Eaton
   c. Leviton
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hubbell
   b. Eaton
   c. Leviton
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-15R.
4. Standards: Comply with UL 498 and UL 943 Class A.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.04 CORD AND PLUG SETS

A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

B. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.

C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.05 TOGGLE SWITCHES, 120/277 V, 20 A

A. Single-Pole Switches, 120/277 V, 20 A:
1. **Manufacturers: Subject to compliance with requirements, provide products by one of the following:**
   a. **Hubbell**
   b. **Eaton**
   c. **Leviton**
2. Standards: Comply with UL 20 and FS W-S-896.

2.06 OCCUPANCY SENSORS: Refer to specification section 260923.

2.07 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices. Refer to drawings for requirements.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with gasketedlockable flap-type “extra duty weatherproof-in-use” cover.

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
   a. Cut back and pigtail, or replace all damaged conductors.
   b. Straighten conductors that remain and remove corrosion and foreign matter.
   c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:
1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 GFCI RECEPTACLES

A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use clear adhesives label with black letters on face of plate, and durable wire markers or tags inside outlet boxes.

C. Unless directed by Architect, provide identification on inside surface of wall plate.

3.04 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

D. Tests for Receptacles:
   1. Line Voltage: Acceptable range is 105 to 132 V.
   2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
   3. Ground Impedance: Values of up to 2 ohms are acceptable.
   4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
   5. Using the test plug, verify that the device and its outlet box are securely mounted.
   6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

E. Wiring device will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 275116 - EXISTING PUBLIC ADDRESS SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. BICSI TDMM - Telecommunications Distribution Methods Manual, 15th Edition; 2024.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. Existing Public Address system is a Valcom IP6000 system. All devices and components shall be compatible and provide an extension of the system to the new CTE building.

B. The Contractor shall furnish and install all equipment including, but not limited to, outlet boxes, wiring, speakers, and all other necessary equipment to provide a complete operating system as indicated with the contract documents. Provide all necessary wall plates, specialty boxes, etc., not provided by others.

C. The Communication System shall be interfaced with the School's VOIP/telephone system to ensure full access to the Communication System speakers. Coordinate all work with the District's IT Department.

D. The Communication System shall be programmed to meet the School District requirements. These requirements shall be provided directly from the representatives selected by the School District. The Contractor shall meet with the School District's selected representatives and obtain programming criteria prior to programming the system. The system shall be tested in the presence of the School Districts representatives prior to completion to ensure compliance with the School District criteria. The Contractor shall make required modifications to the system as required to satisfy all of the School District's requirements. All scheduling for work performed with the School Districts representative shall be done in written form. Copies of all communication shall be included in the close out package.

E. At no time during the construction phase when school is in session and when teachers are on campus shall it be acceptable for the intercom-paging-class pass and clock system to be inoperable or not serving the buildings connected to the existing intercom-paging-class change tone and clock system. The contractor shall provide temporary intercommunications between all buildings and rooms within the buildings whenever the system is inoperative or shut-down for any reason. A temporary school wide intercommunications plan to be implemented during system shut-downs or inoperable periods shall be submitted to the School District for approval prior to start of the demolition phase. Temporary school wide

intercommunications shall at a minimum consist of walky-talkies for all staff members and battery operated self-correcting atomic clocks for all rooms currently provided with system clocks.

1.04 ACTION SUBMITTALS

A. Submit layout drawings of the communication system and all components.

B. Submit drawings of control equipment showing all major components and positions in the rack.

C. Provide block diagrams showing components and relative connections.

D. Submit a certificate showing a completion of installation, programming, and service training from the system manufacturer.

E. Submit data sheets on equipment provided.

F. Shop Drawings: Signed and sealed by a qualified professional engineer or an RCDD.
   1. Equipment Details: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
   2. Station-Arrangement Details
   3. Wiring Diagrams: Signal, and control wiring. Include the following:
      a. Single-line diagram showing interconnection of components
      b. Cabling diagram showing cable routing.

1.05 INFORMATION SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For public address systems to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in General Trades Specification Sections include the following:
      a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
      b. Operating instructions laminated and mounted adjacent to operating console location.
      c. Training scheduling communication documents.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. The contractor shall provide a 2 (two)-year guarantee of the installed system against defects in material and workmanship. All warranty material shall be provided at no expense to the Owner. Guarantee period shall begin on the date of acceptance by the Owner or Engineers.

B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. IP Speaker/Clock: One for every 20 of each type installed. Furnish at least one of each type.
   2. IP Dual Sided Speaker/Sign: One for every 20 of each type installed. Furnish at least one of each type.
   3. IP Wall Speaker: One for every 20 of each type installed. Furnish at least one of each type.
   4. IP Flexhorn: One for every 20 of each type installed. Furnish at least one of each type.
   5. IP Horn: One for every 20 of each type installed. Furnish at least one of each type.
   6. Call/Emergency Switch: One for every 20 of each type installed. Furnish at least one of each type.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   1. Personnel certified by NICET as Audio Systems Level II or III Technician.

B. Testing Agency Qualifications: Qualified agency, with the experience and capability to conduct testing indicated.
   1. Testing Agency's Field Supervisor: Currently certified by NICET at Level III to supervise on-site testing.

1.09 COMMUNICATION SYSTEM FUNCTIONS AND FEATURES

A. The Communication System shall provide at least the following functions and features:

B. Direct dialed, hands-free, two-way communication from all administrative telephones to classroom locations equipped with a talkback speaker.

C. Normal call button initiated hands-free, two-way communication from all classroom locations equipped with a talkback speaker to an administrative telephone. Emergency call button shall be programmed to initiate hands-free, two-way communication from all classroom locations equipped with a talkback speaker to an administrative, primary and secondary telephone as directed by owner.

D. Microprocessor based PoE system capable of handling unlimited end-points. An end-point is defined as a device with an IP address. The system IP speakers must be SIP compliant.

E. System shall be a VoIP system compatible with 45 ohm 2-way speakers, 25v 2-way speakers, self-amplified one-way speakers and VoIP speakers. The system should also have 1, 2 and 4 zone one-way gateways for common area announcements.

F. System shall interface with any SIP capable VoIP telephone system, analog telephone system, or single line telephone, thus allowing the school(s) to upgrade or replace their telephone system without suffering a requirement to replace, or lose any feature of, their

internal communications (intercom) system. Any system that limits system features based upon any selected telephone system, and/or is proprietary to one or only a few telephone systems shall not be acceptable.

G. System shall be capable of initiating emergency notifications by internet browser from anywhere on the network.

H. Classroom speakers shall be software assignable to an unlimited number of audio groups.

I. Provide 1 to 11 digits numbering plan, thus allowing the classroom speaker and the classroom telephone to be the same architectural number.

J. Classroom initiated intercom calls must be able to be assigned to ring at specific administrative ports. These administrative ports shall have the flexibility to be forwarded to other administrative ports should a call go unanswered or should the assigned administrative port be busy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Valcom Engineering Solutions (Phillips Pro Systems)

B. Source Limitations: Obtain public address system from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

2.02 COMMUNICATION SYSTEM

A. Required Class Connection IP talkback/clock combo speakers shall be
   1. SIP and Multicast Enabled
   2. Easy to install via RJ45
   3. Powered Over Ethernet
   4. Controlled and Set-Up via a software interface
   5. Firmware Upgradeable
   6. Fully Supervised
   7. Compatible with Cisco, Nortel, Avaya and most VoIP phone systems
   8. Capable of providing superior talkback quality
   9. 12” Analog or 2.5” Digital Clock
   10. Surfaced or Recess Mount

B. Required Class Connection IP Talkback horns shall be:
   1. Programmable for one way or two way operation
   2. SIP and Multicast Enabled

3. Easy to Install
4. Powered Over Ethernet
5. Controlled and Set-Up via a software interface
6. Firmware Upgradeable
7. Fully Supervised
8. Available in Beige, Gray or White
9. Compatible with Cisco, Nortel, Avaya, and most VoIP phone systems
10. Capable of providing superior talkback quality
11. Able to accommodate a call-in button

C. Required Class Connection IP Speakers shall be:
1. Programmable for one way or two way operation
2. SIP and Multicast Addressable
3. Easy To Install Via RJ45
4. Powered Over Ethernet
5. Controlled and Set-Up via a software interface
6. Firmware Upgradeable
7. Fully Supervised
8. Compatible with Cisco, Nortel, Avaya, and most VoIP telephone systems
9. Capable of providing superior talkback quality
10. Able to accommodate a call-in button

D. Required Class Connection IP One Way Horns shall be:
1. SIP and Multicast Enabled
2. Easy to install
3. Powered Over Ethernet
4. Available in Beige, Gray or White
5. Controlled and Set-Up via a software interface
6. Firmware Upgradeable
7. Compatible with Cisco, Nortel, Avaya and most VoIP phone systems
8. Capable of providing superior audio quality

E. Required IP Sign/Speaker shall be:
1. SIP Enabled
2. Easy to install via RJ45
3. Powered Over Ethernet
4. Controlled and Set-Up via a software interface
5. Firmware Upgradeable
6. Fully Supervised
7. Compatible with Cisco, Nortel, Avaya and most VoIP phone systems
8. Easy to read digital display
9. Font and Color Options
10. LED flashers
11. Relay for additional equipment
12. Available in Black or Metallic
13. Surfaced or Ceiling Mount

2.03 CONDUCTORS/CABLES/NETWORK EQUIPMENT – BY OTHERS

A. Owner/others will provide conductors, cabling, supports and any new network equipment as required. Owner/others shall acquire and comply with the latest manufacturer's server network requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wiring Method by Owner/others: Install wiring in raceways except within consoles, desks, and counters. Conceal cables and raceways except in unfinished spaces.

B. Wiring Method by Owner/Others: Install wiring in raceways except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum-board partitions where cable wiring method may be used. Use plenum cable in environmental air spaces, including plenum ceilings. Conceal cables and raceways except in unfinished spaces.

C. Owner/Others shall install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours. Secure and support cables by straps, J-hooks, or similar fittings designed and installed to avoid damage to cables. Secure cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, or fittings.

D. Wiring within Enclosures by Owner/Others: Bundle, lace, and train conductors to terminal points with no excess. Use lacing bars in cabinets.

E. Control-Circuit Wiring by Owner/Others: Install number and size of conductors as recommended by system manufacturer for control functions indicated.

F. Separation of Wires by Owner/Others: Separate speaker-microphone, line-level, speaker-level, and power wiring runs as specified by BICSI TDMM 12 Edition.

G. Owner/Others shall match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

H. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

3.02 SYSTEM PROGRAMMING

A. Programming: Fully brief Owner on available programming options. Record Owner's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Schedule tests in writing with School Districts Representatives at least seven days' advance notice of test performance.
   2. After installing public address system and after electrical circuitry has been energized, test for compliance with requirements.
   3. Operational Test: Test originating station-to-station, all-call, and page messages at each intercom station. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.

E. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Verify the server and devices are running the latest software revisions.

F. Public address system will be considered defective if it does not pass tests and inspections.

3.04 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service. This start up service is not considered owner training.
   1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
   2. Complete installation and startup checks according to manufacturer's written instructions.

3.05 ADJUSTING

A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels and for any initial trouble shooting.

END OF SECTION

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

B. IEEE 1100 - IEEE Recommended Practice for Powering and Grounding Electronic Equipment; 2005.

C. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 1221 - Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems; 2019, with Amendment (2021).

J. UL 38 - Standard for Manual Signaling Boxes for Fire Alarm Systems; Current Edition, Including All Revisions.

K. UL 217 - Standard for Smoke Alarms; Current Edition, Including All Revisions.

L. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

M. UL 268A - Standard for Smoke Detectors for Duct Application; Current Edition, Including All Revisions.

N. UL 464 - Standard for Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories; Current Edition, Including All Revisions.

O. UL 521 - Standard for Heat Detectors for Fire Protective Signaling Systems; Current Edition, Including All Revisions.

P. UL 864 - Control Units and Accessories for Fire Alarm Systems; Current Edition, Including All Revisions.

Q. UL 1076 - Proprietary Burglar Alarm Units and Systems; Current Edition, Including All Revisions.

R. UL 1480 - Standard for Speakers for Fire Alarm and Signaling Systems, Including Accessories; Current Edition, Including All Revisions.

S. UL 1638 - Standard for Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories; Current Edition, Including All Revisions.

T. UL 1711 - Amplifiers for Fire Protective Signaling Systems; Current Edition, Including All Revisions.

U. UL 1971 - Standard for Signaling Devices for the Hearing Impaired; Current Edition, Including All Revisions.

V. UL 2017 - General-Purpose Signaling Devices and Systems; Current Edition, Including All Revisions.

W. UL 2034 - Standard for Single and Multiple Station Carbon Monoxide Alarms; Current Edition, Including All Revisions.

X. UL 2075 - Standard for Gas and Vapor Detectors and Sensors; Current Edition, Including All Revisions.

Y. UL 2572 - Mass Notification Systems; Current Edition, Including All Revisions.

1.02 RELATED DOCUMENTS

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

1.04 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:

A. 26.00 Electrical

B. 26.05 Common Work Results for Electrical

C. 21.10 Water-Based Fire-Suppression System

D. 21.22 Clean Agent Fire Extinguishing Systems

E. 23.00 Heating, Ventilating, and Air-Conditioning (HVAC)

F. 25.00 Integrated Automation

1.05 The system and all associated operations shall be in accordance with the following:

A. Requirements of the following Michigan Building Code: IBC 2015 Edition

B. Requirements of the following Model Fire Code: IFC 2015 Edition

C. Requirements of the following Model Mechanical Code: IMC 2015 Edition

D. NFPA 72, National Fire Alarm Code, 2019 Edition

E. NFPA 70, National Electrical Code, 2017 Edition

F. NFPA 101, Life Safety Code, 2018 Edition

G. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems, 2015 Edition

H. ICC/ANSI A117.1 Accessible and Useable Buildings and Facilities, 2017 Edition

I. Local Jurisdictional Adopted Codes and Standards

J. ADA Accessibility Guidelines

1.06 SUMMARY

1.07 This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.

1.08 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.

1.09 The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:

A. Fire alarm system detection and notification operations.

B. Control and monitoring of elevators, door hold-open devices, and other equipment as indicated in the drawings and specifications.

C. Emergency Responder Radio Coverage interface.

D. One-way supervised automatic voice alarm operations.

1.10 DEFINITIONS

A. ADA: Americans with Disabilities Act

B. AHJ: Authority Having Jurisdiction

C. ANSI: American National Standards Institute

D. ASME: American Society of Mechanical Engineers

E. FACU: Fire Alarm Control Unit

F. FM: Factory Mutual

G. IBC: International Building Code

H. ICC: International Code Council

I. IDC: Initiating Device Circuit

J. IEEE: Institute of Electrical and Electronic Engineers

K. IFC: International Fire Code

L. IMC: International Mechanical Code

M. IRI: Industrial Risk Insurers

N. LED: Light-emitting diode.

O. NAC: Notification Appliance Circuit

P. NFPA: National Fire Protection Association

Q. NICET: National Institute for Certification in Engineering Technologies.

R. RAC: Releasing Appliance Circuit

S. SLC: Signaling Line Circuit

T. UL: Underwriters Laboratories

U. ULC: Underwriters Laboratories, Canada

1.11 SCOPE OF WORK

1.12 Replace existing fire alarm system with new Addressable Voice Type. Electrical contactor shall coordinate with AHJ on acceptance of existing system removed when the facility is un-occupied, before new system is installed and tested.

1.13 SYSTEM DESCRIPTION

1.14 General: Provide a complete, non-coded addressable microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

1.15 Power Requirements

A. The control unit shall receive AC power via a dedicated fused disconnect circuit.

B. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24hours with 15minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.

C. All circuits requiring system-operating power shall be 24 VDC nominal voltage and shall be individually fused at the control unit.

D. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.

E. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.

F. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.

G. The system shall support 100% of addressable initiating devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.

H. Loss of primary power shall sound a trouble signal at the FACU. FACU shall indicate when the system is operating on an alternate power supply.

1.16 Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary.

A. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.

B. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory.

C. Panels shall be capable of full system operation during new site specific configuration download, master exec downloads, and slave exec downloads.

D. Remote panel site-specific software and executive firmware downloads shall be capable of being performed over proprietary fire alarm network communications and via TCP/IP Ethernet network communications. Ethernet access to a fire alarm panel via a customer's LAN/WAN connection shall be capable of providing access only to authenticated users through a cryptographically authenticated and secure SSL tunnel.

E. Panels shall automatically store all program changes to the panel’s non-volatile memory each time a new program is downloaded. Panels shall be capable of storing the active site-specific configuration program and no less than 9 previous revisions in reserve. A compare utility program shall also be available to authorized users to compare any two of the saved programs. The compare utility shall provide a deviation report highlighting the changes between the two compared programs.

F. Panels shall provide electronic file storage with a means to retrieve a record copy of the site-specific software and up to 9 previous revisions. Sufficient file storage shall be provided for other related system documentation such as record drawings, record of completion, owner’s manuals, testing and maintenance records, etc.

G. The media used to store the record copy of site-specific software and other related system documentation shall be electrically supervised. If the media is removed a trouble shall be reported on the fire alarm control unit.

1.17 History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

1.18 Recording of Events: The system shall be capable of recording all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout shall differentiate alarm signals from all other printed indications.

1.19 Wiring/Signal Transmission:

A. Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.

B. System connections for initiating device circuits shall be Class B, Style D, signaling line circuits shall be Class A, Style 6, Class B, Style 4 and notification appliance circuits shall be Class B, Style Y.

C. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACU. Provide a distinctive indicating audible tone and alphanumeric annunciation.

D. Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.

1.20 Supplemental Notification and Remote User Access (Fire Panel Internet Interface)

A. Fire Alarm Control Unit (FACU) shall have the to provide supplemental notification and remote user access to the FACU using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3.

B. A standard RJ-45 Ethernet connection shall connect to the owner's Ethernet network. Provisions for that connection must be provided at each fire alarm control unit as part of the contract.

C. The means of providing supplemental email and SMS text messaging notification shall be agency listed for specific interfaces and for the purpose described in this section. The use of non-listed external third party products and interfaces is not acceptable.

D. The fire panel internet interface shall be capable of sending automated notification of discrete system events via email and SMS text messaging to up to 50 individual user accounts and via email to up to 5 distribution lists.

E. Each user account and distribution list shall be capable of being configurable for the specific type of events to be received. Each account shall be configurable to receive notification upon any combination of the following types of events:
1. Fire Alarm,
2. Priority 2,
3. Supervisory,
4. Trouble,

5. Custom Action Messages,
6. Fire Panel Internet Interface Security Violations

F. Each user account and distribution list shall be capable of being configurable for the specific content to be received. Each account shall be configurable to receive any combination of the following message content:
1. Summary,
2. Event Information,
3. Message,
4. Emergency Contacts,
5. Host Fire Alarm Control Unit Information

G. Each user account and distribution list shall be capable of being configurable for the type of Fire Alarm Control Unit Logs and Reports to be received. Each account shall be configurable to receive any combination of the following Logs and Reports via email:
1. Alarm Log,
2. Trouble Log,
3. Analog Sensor Status Report,
4. Analog Sensor Service Report,
5. Almost Dirty, Dirty and Excessively Dirty Sensor Report,
6. CO Analog Sensor Service Report,
7. Addressable Notification Appliance Candela Report,
8. Addressable Notification Appliance Status Report

H. Each user account and distribution list shall be capable of receiving email distribution of Fire Alarm Control Unit Logs and Reports On-Demand or automatically on a Pre-Determined schedule. Receipt of Logs and Reports shall be capable of being scheduled as follows:
1. Weekly, or
2. Bi-weekly, or
3. Monthly

I. The Fire Alarm Control Unit Logs and Reports shall be sent in CSV file format which can be imported into common database applications for viewing, sorting, and customization.
1. Each user account shall be capable of being configured to receive system events via email and/or SMS text messaging.
2. Each distribution list shall be capable of supporting up to 20 email address recipients.

J. The means to provide email notification shall be compatible with SMTP mail servers, ISP email services, and Internet email services. Communication with the email server shall be verified at selectable intervals of 5 to 30 minutes.

K. Email operation shall be capable of being disabled for service by the system administrator.

L. An email log shall be accessible to authorized users. The email log shall display the 25 most recent email notifications sent.

M. The fire panel internet interface for supplemental notification and remote user access shall support:
1. Secure HTTPS/SSL encrypted connections,
2. Up to 50 individual password protected user accounts,

3. Dynamic and Static IP addressing,
4. IP Address Blocking,
5. Restricted number of log-in attempts before lock-out configurable from 1 to 20,
6. Lock-out duration after unsuccessful log-in attempts configurable from 0 to 24 hours,
7. Email notification to Administrators of unsuccessful log-in attempts,
8. Automatic lock-out reset upon a new event,
9. Automatic inactivity logout configurable from 10 minutes to 24 hours,
10. Firmware updates over Ethernet,
11. Set-up and configuration via Local Service Port or via Remote Services over LAN/WAN connection

N. Authorized users shall be capable of accessing the fire alarm panel using a compatible web browser (Internet Explorer 6.0 or higher) and a secure HTTPS/SSL encrypted connection.

O. The fire panel internet interface shall support concurrent connections for up to 5 users plus 1 administrator.

P. Authorized users with remote access shall be capable of:
1. Viewing the fire panel internet interface web home page
   a. The fire panel internet interface home page shall display system status information and provide links to detailed status information and fire alarm panel reports and history logs
   b. The web browser on the user's computer shall automatically refresh system status information upon a new event
      1) Systems that require a manual refresh to acquire updated system status information shall not be accepted
2. Viewing the fire alarm panel detailed card status information
3. Viewing the fire alarm panel detailed point status information
4. Viewing the fire alarm panel reports and history logs
5. Viewing the fire panel internet interface email log
6. Viewing system summary information
7. Accessing Custom Hypertext Links

Q. The fire panel internet interface home page shall support customization to display the following information:
1. Customer Name and Address,
2. Fire Panel Location or Building Name,
3. Up to 10 Custom Hypertext Links with Text Descriptions

1.21 Required Functions: The following are required system functions and operating features:

A. Priority of Signals: Fire alarm events have highest priority or have secondary priority based upon emergency condition. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second or primary, based upon emergency condition-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

B. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACU after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.

C. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.

D. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACU and the remote annunciator, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.

E. Selective Alarm: A system alarm shall include:
1. Indication of alarm condition at the FACU and the annunciator(s).
2. Identification of the device /zone that is the source of the alarm at the FACU and the annunciator(s).
3. Operation of audible and visible notification appliances until silenced at FACU.
4. Closing doors normally held open by magnetic door holders. Unlocking designated doors.
5. Shutting down supply and return fans serving zone where alarm is initiated.
6. Closing smoke dampers on system serving zone where alarm is initiated.
7. Initiation of smoke control sequence.
8. Transmission of signal to the supervising station.
9. Initiation of elevator Phase I functions (recall, shunt trip, illumination of indicator in cab, etc.) in accordance with ANSI/ASME A17.1 / CSA B44, Safety Code for Elevators and Escalators, when specified detectors or sensors are activated, as appropriate.

F. Supervisory Operations: Upon activation of a supervisory device such as a tamper switch, the system shall operate as follows:
1. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
2. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
3. Record the event in the FACU historical log.
4. Transmission of supervisory signal to the supervising station.
5. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.

G. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.

H. Priority Two Operations: Upon activation of a priority two condition such as intrusion alert or weather alert, the system shall operate as follows:
1. Activate the system priority two audible signal and illuminate the LED at the control unit and the remote annunciator.
2. Pressing the Priority 2 Acknowledge Key will silence the audible signal while maintaining the Priority 2 LED "on" indicating off-normal condition.
3. Record the event in the FACU historical log.

4. Transmission of priority two signal to the supervising station.
5. Restoring the condition shall cause the Priority 2 LED to clear and restore the system to normal.

I. System Reset
1. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
2. Should an alarm condition continue, the system will remain in an alarmed state.

J. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.

K. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
1. The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
2. Control relay functions associated with one of the 8 testing groups shall be bypassed.
3. The control unit shall indicate a trouble condition.
4. The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
5. The unit shall automatically reset itself after signaling is complete.
6. Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
    a. Any device which is activated during the time that Walktest is enabled, but is not within the group under test shall immediately cause a normal alarm sequence to commence as if the system was not under any testing sequence.

L. Install Mode: The system shall provide the capability to group all non-commissioned points and devices into a single "Install Mode" trouble condition allowing an operator to clearly identify event activations from commissioned points and devices in occupied areas.
1. It shall be possible to individually remove points from Install Mode as required for phased system commissioning.
2. It shall be possible to retrieve an Install Mode report listing that includes a list of all points assigned to the Install Mode. Panels not having an install mode shall be reprogrammed to remove any non-commissioned points and devices.

M. Module Distribution:
1. The fire alarm control unit shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
    a. Initiating Device Circuits
    b. Notification Appliance Circuits
    c. Auxiliary Control Circuits

d. Graphic Annunciator LED/Switch Control Modules
   1) In systems with two or more Annunciators and/or Command Centers, each Annunciator/Command Center shall be programmable to allow multiple Annunciators/Command Centers to have equal operation priority or to allow hierarchal priority control to be assigned to individual Annunciator/Command Center locations.
e. Initiating Device Signaling Line Circuits
f. Notification Appliance Signaling Line Circuits
g. Power Supplies
h. Voice System Amplifiers

N. Service Gateway: A Service Gateway software application is provided that allows an authorized service person to remotely query panel status during testing, commissioning, and service without the need to return to the panel using standard email or instant messaging tools. The owner shall request the service application requirements for the software system. For systems without a service gateway application the service provider shall provide a minimum of two technicians for any system testing or commissioning.

1.22 Integrated Automation

A. Security Integration
1. The FA System shall provide the means to be integrated directly to a Software House C•Cure 9000 Security Management System (SMS) or a Kantech Corporate and Global EntraPass system via a software interface for the purpose of communicating fire alarm events directly to the security system.
2. Communication between the FA System and security system shall be accomplished using Computer Port Protocol (CPP).
   a. The FA and the security system shall be connected via a local or network serial port server based RS-232 serial port connection.
3. The CPP shall consist of a bi-directional serial protocol capable of accessing most of the Fire Alarm Control Unit (FACU) diagnostic features.
4. The interface shall provide the means to communicate the following information to the security system:
   a. Device/Point status changes (e.g., Fire, Trouble, Disabled)
   b. Panel event status (e.g. Number of Unacknowledged Fire Alarms, Card Failure Troubles, etc.)
   c. Panel health status (e.g., AC power, battery status)
5. Interface software shall include a data acquisition function that provides the following:
   a. Establishes and maintains a supervised serial link
   b. Extraction of the point database from the FACU
   c. Merges the FACU database into the C•Cure SMS database
6. The software interface shall not allow system control functionality from the security system to the FA System.
7. The installation, programming and maintenance of the FA/security integration software interface shall be conducted by factory trained certified technicians.

B. Building Automation and Control Network (BACnet) Integration
1. The fire alarm control unit shall be capable of providing a one-way communications interface between the fire alarm control unit and an industry-standard Building

Automation and Control Network (BACnet) using ASHRAE® BACnet® IP (internet protocol) compliant with ANSI/ASHRAE Standard 135.

2. The BACnet communications module shall be agency listed to UL Standard 864 or ULC Standard S527.
3. The fire alarm control unit shall be capable of communicating status changes of up to 1500, 5,000 or 15,000 devices and system points to the building automation system. This shall include the capability to discretely identify and report the status of each notification appliance and initiating device.
4. Status of addressable initiating and notification devices shall be accomplished via multi-state BACnet objects, and each point shall include detailed custom descriptions matching those provided in the fire alarm control panel site specific programming.
5. Programming of the BACnet interface shall be accomplished using the current version of the manufacturer's approved fire alarm panel programming software.
6. MS/TP Master and MS/TP Slave data link layer options communicating at baud rates up to 76,800 bps shall be supported.
7. The interface shall be capable of supporting ANSI X3.4, ISO 10656 (ICS-4), ISO 10656 (UCS-2), ISO 8859-1, or IBM/Microsoft DBCS character sets.
8. A standard RJ-45 Ethernet connection to the Building Automation System Ethernet network shall be provided at the fire alarm control unit as part of the contract.

C. Refer to section: 25.00 Integrated Automation

1.23 Analog Smoke Sensors:

A. Monitoring: FACU shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.

B. Environmental Compensation: The FACU shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.

C. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACU.

D. Sensitivity Testing Reports: The FACU shall provide sensor reports that meet NFPA 72 calibrated test method requirements.
   1. Reports shall be capable of being printed for annual recording and logging of the calibration maintenance schedule.
   2. Where required, reports shall be accessible remotely through:
      a. A Fire Panel Internet Interface using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3. The Fire Panel Internet Interface shall be capable of automatically scheduling email reports to individual user accounts on a weekly, bi-weekly, or monthly schedule

E. The FACU shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACU as "ALMOST DIRTY." This condition

provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACU and subsequently a system trouble is reported to the Supervising Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.

F. The FACU shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.

G. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.

H. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.

I. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

1.24 Fire Suppression Monitoring:

A. Water flow: Activation of a water flow switch shall initiate general alarm operations.

B. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.

C. Water flow switch and sprinkler valve tamper switch shall be capable of existing on the same initiating zone. Activation of either device shall distinctly report which devicehas been activated on the initiating zone.

1.25 Audible Alarm Notification: By horns in areas as indicated on drawings.

1.26 Audible Alarm Notification: By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.

A. Automatic Voice Evacuation Sequence:
1. The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.
2. All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.

1.27 Speaker: Speaker notification appliances shall be listed to UL 1480.

A. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted/shielded wire.

B. 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.

C. The speaker shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for general signaling.

1.28 Manual Voice Paging

A. The system shall be configured to allow voice paging. Upon activation of any speaker manual control switch, the alarm tone shall be sounded over all speakers in that group.

B. The control unit operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speakers.

C. Total building paging shall be accomplished by the means of an "All Call" switch.

1.29 Constant Supervision of Non-Alarm Audio Functions

A. When required, the system shall be configured to allow Non-Alarm Audio (NAA) functions such as background music or general/public address paging.

B. During NAA operation, the speaker circuit shall be electrically supervised to provide continuous monitoring of the speaker circuit.

C. During an alarm condition, supervision shall be disabled and alarm signals delivered to speakers.

1.30 Emergency Communications/Mass Notification: By voice evacuation and tone signals on loudspeakers used for fire alarm system evacuation. The Mass Notification System shall consist of all necessary hardware equipment and software programming to perform the following functions:

A. Mass Notification both pre-recorded and live messaging.

B. Mass Notification visual alerting from both ALERT strobe devices and text messaging displays.

1.31 Firefighter's Phone: Provide a supervised, two-way communication system between the Command Center/main fire alarm control unit and emergency phones.

A. The firefighter's phone system shall be capable of handling single or simultaneous conversations with all phones connected into the system. As many as six phones shall be able to be connected into the active conversation.

B. The phone system circuits shall be designed to prevent static, hum or other interference for clear, intelligible two-way conversation between all phones of the system.

C. The phone system circuits shall be supervised, such that the FACU shall be able to differentiate between whether a handset has been plugged into the emergency phone jack and whether the circuit has a shorted wire.

D. A beeping busy signal shall indicate to the person attempting to use a remote phone that the signal is being received at the control unit and that the lines are intact.

E. The act of plugging a handset into an emergency phone jack or removal of any phone from its normal hook position shall cause an audible and visual indication at the control unit. Picking up of the master phone and acknowledgment of the phone circuit shall silence the tone and allow for direct two-way communications.

F. The act of unplugging handsets in use and replacement of remote phones to their cradle shall restore normal supervisory functions.

G. Provide emergency phone jacks for installation in each elevator car by the elevator contractor. Required wiring from elevator controls to each elevator car shall be furnished and installed by the elevator contractor.

H. Provide emergency phone jacks as shown on the plans. Each jack shall be mounted on a stainless steel single gang plate with the words "Fire Emergency Phone" screened on each.

I. Provide a minimum of five (5) pluggable emergency phones within a storage cabinet.

1.32 Addressable Notification Appliances (Applies only where addressable notification is provided):

A. Monitoring: The FACU shall monitor individual addressable notification appliances for status, condition, type of appliance, and configured appliance settings. A fault in any individual appliance shall automatically report a trouble condition on the FACU.

B. Individual Appliance Custom Label: Each addressable appliance shall have its own 40 character custom label to identify the location of the appliance and to aid in troubleshooting fault conditions.

C. Individual Appliance Information Display:
1. The FACU shall be capable of calling up detailed information for each addressable appliance including the appliance location, status, condition, type of appliance, and configured appliance settings.

D. Programmable Appliance Settings:
1. The selectable operation of each addressable notification appliance shall be capable of being configured by the FACU without having to replace or remove the appliance from the wall or ceiling.
    a. Programmable appliance settings for applicable addressable notification appliances shall include:
        1) Operation:
            a) General Evac
            b) Alert
            c) User Defined
        2) Style:
            a) Indoor

b) UL Weatherproof
c) ULC Weatherproof

3) Candela Selections:
a) Indoor: 15, 30, 75, 110, 135, or 185 cd (per ((UL 1971)))
b) UL Weatherproof: 15 or 75 cd (per ((UL 1971))), and 75 or 185 cd (per ((UL 1638)))
c) ULC Weatherproof: 20, 30 or 75 cd (per ULCS526)

4) Horn Volume:
a) Hi
b) Low

5) Horn Cadence:
a) Temporal 3
b) Temporal 4
c) March Time 20 bpm
d) March Time 60 bpm
e) March Time 120 bpm
f) Steady

6) Horn Tone:
a) 520 HZ
b) Bell
c) Slow Whoop
d) Siren
e) Hi / Lo

2. Systems that require replacement or removal of the appliances from the wall or ceiling to change their applicable operation or settings shall not be accepted.

E. Programmable Notification Zones:
1. Changing the notification zone assigned to a notification appliance shall be configurable by the FACU and shall not require additional circuits or wiring.
2. Systems that require additional circuits and wiring to change the notification zone assigned to a notification appliance shall not be accepted.

F. Other Emergency and Non Emergency Notification:
1. Where required, notification appliances for purposes not related to fire alarm shall be capable of:
a. being connected to the same circuit as the fire alarm appliances, and
b. being individually configured for their intended use without requiring additional circuits or wiring.
2. Systems that require separate circuits and wiring for other Emergency and Non Emergency notification shall not be accepted.

G. Addressable Notification Appliance Automated Self-Test:
1. The fire alarm control unit shall be capable of performing an automated functional self-test of all self-test notification appliances and meet the requirements in NFPA 72,14.2.8 Automated Testing and Table 14.4.3.2 testing requirements.
2. Test results for each self-test notification appliance shall be stored in non-volatile memory at the fire alarm control unit.

3. The fire alarm control unit shall be capable of running a functional automated test for all self-test notification appliances in a general alarm group or for all self-test appliances within a specific notification zone.
4. The duration required to complete the automated functional test for all self-test notification appliances shall be accomplished in 2 minutes or less.
5. The automated test results for all self-test notification appliances shall be available from the fire alarm control unit within 4 minutes from the start of the test.
6. If any notification appliance fails its automated functional self-test an audible and visual trouble signal shall be annunciated at the fire alarm control unit.
    a. The self-test trouble signal shall be a latching trouble signal which requires manual restoration to normal.

H. Addressable Notification Appliance Reports:
1. The fire alarm control unit shall maintain configuration and test data for each self-test addressable notification appliance.
2. The fire alarm control unit shall be capable of generating configuration, self-test, and deficiency reports, that can be viewed through the fire alarm control unit user interface or printed via the fire alarm control unit service port.
    a. At minimum, the configuration report shall include the following information applicable for each addressable notification appliance:
        1) Point ID
        2) Custom Label
        3) Device Type
        4) Candela Setting
    b. At minimum, the self-test report shall include the following information applicable for each self-test notification appliance:
        1) Point ID
        2) Custom Label
        3) Time and Date of last test
        4) Pass / Fail results of last visual test
        5) Pass / Fail results of last audible test
3. The fire alarm control unit shall also be capable of providing a deficiency report that includes a list of all self-test notification appliances that have failed self-test.

I. Magnet test: When the control unit is in diagnostic mode, the appliances shall be capable of being tested with a magnet. The magnet diagnostics shall:
1. Pulse the appliance LED to indicate appliance address and
2. briefly flash the individual strobe to confirm visible appliance operation
3. briefly sound the individual speaker to confirm the audible appliance operation

1.33 SUBMITTALS

1.34 General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

A. 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.

B. Wiring diagrams from manufacturer.

C. Shop drawings showing system details including location of FACU, all devices, circuiting and details of graphic annunciator.

D. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.

E. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.

F. Operating instructions for FACU.

G. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.

H. Product certification signed by a certified representative of the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.

I. Record of field tests of system.

1.35 Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions, if required, to make clarifications or revisions to obtain approval.

1.36 QUALITY ASSURANCE

1.37 Installer Qualifications: A factory authorized installer is to perform the work of this section.

1.38 Each and every item of the Fire Alarm System shall be listed under the appropriate category by a Nationally Recognized Testing Laboratory and shall bear the respective "NRTL" label.

1.39 PROJECT CONDITIONS

1.40 Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

A. Notify Architect/Owner no fewer than two days in advance of proposed interruption of fire-alarm service.

B. Do not proceed with interruption of fire-alarm service without Architect's/Owner's written permission.

1.41 SEQUENCING AND SCHEDULING

1.42 Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

1.43 Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.44 SOFTWARE SERVICE AGREEMENT

1.45 Comply with UL 864.

1.46 Technical Support: Beginning with Substantial Completion, provide software support for two years.

1.47 Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

A. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.48 MAINTENANCE SERVICE

1.49 Warranty Maintenance Service: Provide maintenance of fire alarm systems and equipment for a period of 24 months, using factory-authorized service representatives

1.50 Basic Services: Routine maintenance visits on an "as needed" basis at times scheduled with the Owner. Respond to service calls within 24 hours of notification of system trouble either by customer visit or other customer contact as necessary. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.

1.51 Additional Services: Perform services within the above 24-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.

1.52 Maintenance Service Contract: No later than 60 days prior to the expiration of the warranty maintenance services, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. As an option with this proposal, deliver to the Owner a proposal to provide scheduled inspection and testing services for a one-year term. Owner will be under no obligation to accept maintenance service contract proposal or inspection and testing proposal.

1.53 EXTRA MATERIALS

1.54 General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:

A. Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.

B. Notification Appliances: Furnish quantity equal to 10 percent of each type and number of units installed, but not less than one of each type.

C. Smoke Detectors or Sensors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.

D. Detector or Sensor Bases: Furnish quantity equal to 2 percent of each type and number of units installed but not less than one of each type.

E. Printer Ribbons: Furnish 6 spare printer ribbons when a printer is provided.

PART 2 PRODUCTS

2.01 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

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

A. Simplex, a Johnson Controls Company

2.03 Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

2.04 Alternate products must be submitted to the Engineer/Owner two weeks prior to at the time of bid for approval. 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.

2.05 The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and NICET Level II or Level III certified technicians, and shall maintain a service organization within 100 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

2.06 SYSTEMS OPERATIONAL DESCRIPTION

2.07 Fire-alarm signal initiation shall be by one or more of the following devices and systems:

A. Manual stations.

B. Heat detectors.

C. Flame detectors.

D. Smoke detectors.

E. Duct smoke detectors.

F. Verified automatic alarm operation of smoke detectors.

G. Automatic sprinkler system water flow.

H. Heat detectors in elevator shaft and pit.

I. Fire-extinguishing system operation.

J. Fire standpipe system.

2.08 Fire-alarm signal shall initiate the following actions as required:

A. Continuously operate alarm notification appliances.

B. Identify alarm at fire-alarm control unit and remote annunciators.

C. Transmit an alarm signal to the remote alarm receiving station.

D. Unlock electric door locks in designated egress paths.

E. Release fire and smoke doors held open by magnetic door holders.

F. Activate voice/alarm communication system.

G. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.

H. Activate smoke-control system (smoke management) at firefighter smoke-control system panel.

I. Activate stairwell and elevator-shaft pressurization systems.

J. Close smoke dampers in air ducts of designated air-conditioning duct systems.

K. Recall elevators to primary or alternate recall floors.

L. Activate emergency lighting control.

M. Activate emergency shutoffs for gas and fuel supplies.

N. Record events in the system memory.

2.09 Supervisory signal initiation shall be by one or more of the following devices and actions:

A. Valve supervisory switch.

B. Low-air-pressure switch of a dry-pipe sprinkler system.

C. Elevator shunt-trip supervision.

2.10 System trouble signal initiation shall be by one or more of the following devices and actions:

A. Open circuits, shorts, and grounds in designated circuits.

B. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.

C. Loss of primary power at fire-alarm control unit.

D. Ground or a single break in fire-alarm control unit internal circuits.

E. Abnormal AC voltage at fire-alarm control unit.

F. Break in standby battery circuitry.

G. Failure of battery charging.

H. Abnormal position of any switch at fire-alarm control unit or annunciator.

I. Fire-pump power failure, including a dead-phase or phase-reversal condition.

2.11 System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer where provided.

2.12 FIRE ALARM CONTROL UNIT (FACU)

2.13 The following FACU hardware shall be provided:

A. General: Provide UL 864 listed, Control Units and Accessories for use as; UL 864 Fire Alarm Control Unit, UL 864 Releasing Device Service, UL 2572 Mass Notification System, UL 1076 Proprietary Alarm Unit, UL 1730 Smoke Detector Monitor System,UL 2017 Process Management Equipment, UL 2017 Emergency Alarm System Control Unit.

B. Power Limited base panel with platinum or red (owner selected) cabinet and door, 120 VAC input power.

C. 3,000 point capacity where (1) point equals (1) monitor (input) or (1) control (output).

D. 2000 points of annunciation where one (1) point of annunciation equals:
   1. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
   2. 1 LED on panel or 1 switch on panel.

E. 9.5 Amp Power Supply minimum with temperature compensated, dual-rate battery charger capable of charging up to 110 Ah batteries without a separate external battery charger. Battery charger voltage and amperage values shall be accessible on the FACU LCD display. Optional cooling fan shall be available to increase base power supply from 9.5 to 12.7 Amps. Optional expansion and back-up power supplies shall be available.

F. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.

G. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.

H. Three (3) circuit Class B Addressable Notification Appliance Signaling Line Circuits (SLCs) module.
1. Each Addressable Notification Appliance SLC shall be rated at 3A and capable of supporting up to 127 Notification Appliances per channel.
2. Wiring shall be 18 AWG to 12 AWG unshielded twisted pair wire. Systems that require shielded wire for Notification Appliances shall not be accepted.
3. A constant voltage under both primary and secondary power conditions shall be maintained at the notification appliance field wiring terminal connections in the FACU to ensure the voltage drop on the circuit is consistent under both primary and secondary power conditions.
4. For systems that do not provide a constant voltage source at the FACU notification appliance field wiring terminal connections, the fire alarm contractor shall:
    a. Provide separate point-to-point voltage drop calculations for all notification appliances under worst case secondary power specifications, and
    b. Perform a complete functional test of all notification appliances under worst case secondary power conditions.

I. Three (3) circuit Class B Notification Appliance Circuits (NAC; rated 3A@24VDC, resistive) module. The NAC end-of-line resistor value shall be programmable and selected from a wide range of resistance values.
1. NAC's shall be conventional reverse polarity operation and shall be for synchronized strobes and independent horn/strobe operation over two wires.
2. NACs shall be selectable as auxiliary power outputs derated to 2 A for continuous duty.
3. Strobe synchronization and audible cadence synchronization shall be across all panel NAC circuits. Systems that cannot provide listed synchronization across all panel NAC's shall not be acceptable.

J. Where required provide Intelligent Remote Battery Charger for charging up to 50Ah batteries.

K. Addressable device SLC expansion module with two (2) isolated Class B or Class A loops providing connection for 250 addressable initiating devices, control devices, or isolators. All manufacturers' current line of addressable devices shall be supported by this SLC. An optional four (4) isolated Class B or Class A loops shall be available.

L. IDC/Relay module shall provide for eight (8) points of programmable circuits for either an Initiating Device Circuit (IDC) or Auxiliary Relay (AUX) on an individual circuit basis. The points shall be configurable for Class B, Relay, or Class A but when used for Class A two of the cards points shall be required. Control relay shall be rated 2 A @ 30 VDC/VAC

(resistive) and configurable as either normally open or normally closed. The IDC end-of-line resistor value shall be programmable and selected from a wide range of resistance values.

M. Panel shall be capable of adding 8 conventional zone circuit IDC modules to connect to existing system devices for ease in retrofit applications.

N. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory or other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive or four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable other fire response functions. Each relay shall be provided with an associated feedback point that shall allow monitoring of a related function such as a sail switch on a motor. Relays shall be capable of switching up to ½ A @ 120VAC, inductive or Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 10A @ 250VAC, resistive), operation shall be programmable for other fire response functions. Relays shall be capable of switching up to 10 A @ 250VAC, inductive.

O. The FACU shall support up to (5) RS-232-C ports and one service port. All (5) RS-232 Ports shall be capable of two-way communications.

P. Remote Unit Interface: supervised Class B (Style 4) or Class X (Style 7) serial communication channel for control and monitoring of remotely located annunciators and I/O panels.

Q. Universal Communicator supporting POTS, Internet, and Cellular communications. Shall have multiple connectivity options and be configurable with a primary and secondary path. Paths can use any of the external connections; telephone line, cellular, or LAN Ethernet. Cellulat shall be minimum 3G with 2G fallback. Cellular antenna extension kits shall be available for poor reception areas. IP based transmission; cellular or Ethernet shall be based on ADEMCO Contact ID Alarm Communication Protocol. Programmable DACT for either Common Event Reporting or per Point Reporting.

R. Fire Panel Internet Interface to provide supplemental notification and remote user access to the FACU using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3.

2.14 Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.

2.15 Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

A. The system shall have the capability or include the necessary hardware to provide expanded content, multi-line, operator interface displays as indicated on the drawings and specifications. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator

interface shall provide operator prompts and six context sensitive soft-keys for intuitive operation.

1. Expanded content, multi-line operator interfaces shall be capable of providing the following functions:
   a. Dual language operation with Instant-Switch language selection during runtime.
   b. Activity display choices for:
      1) First 8 Events.
      2) First 5 Events and Most Recent Event (with first and most recent event time and date stamps).
      3) First Event and Most Recent Event (with first and most recent event time and date stamps).
      4) Scrollable List Display displays a scrollable list of active points for the event category (alarm, priority 2, supervisory, or trouble) selected. The position in this list will be the last acknowledged point (not flashing) at the top followed by the next 7 unacknowledged points (flashing).
      5) General Event Status (alarm, priority 2, supervisory, or trouble in system)
      6) Site Plan
   c. Equal or hierarchal priority assignment. In systems with two or more operator interfaces, each operator interface shall be programmable to allow multiple operator interfaces to have equal operation priority or to allow hierarchal priority control to be assigned to individual operator interfaces (locations).
   d. Up to 50 custom point detail messages for providing additional point specific information in detailed point status screens.
2. Expanded content, multi-line displays shall have the capability or include the necessary hardware and software to provide Dual-Language operation as indicated on the drawings and specifications.
   a. Language selection shall be via a switch on the operator interface panel. Operator interface panels shall support instant-language-switchover during runtime to allow the operator to toggle between languages each time the language selection switch is operated, without requiring complicated multi-step processes.
   b. Both one-byte and two-byte characters shall be supported.

2.16 Distributed Module Operation: FACU shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Class B (Style 4) supervised serial communications channel (SLC):

A. Addressable Signaling Line Circuits

B. Initiating Device Circuits

C. Notification Appliance Circuits

D. Auxiliary Control Circuits

E. Graphic Annunciator LED/Switch Control Modules
   1. In systems with two or more Annunciators and/or Command Centers, each Annunciator/Command Center shall be programmable to allow multiple Annunciators/Command Centers to have equal operation priority or to allow hierarchal priority control to be assigned to individual Annunciator/Command Center locations.

F. Amplifiers, voice and telephone control circuits

2.17 Voice Alarm: Provide an emergency communication system, integral with the FACU, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:

A. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.

B. Dual alarm channels permit simultaneous transmission of different announcements to different zones or floors automatically or by use of the central control microphone. All announcements are made over dedicated, supervised communication lines. All risers shall support Class B wiring for each audio channel.

C. Eight channel digitally multiplexed audio for systems that require more than two channels of simultaneous audio. Up to 8 channels of audio shall be multiplexed on either a style 4 or style 7 twisted pair.

D. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones. Optional Microphone Multiplex modules shall support a total of 40 remote microphones.

E. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.

F. When required, Redundant Voice Command Centers shall be capable of generating voice paging from more than one node in a network audio system.

2.18 Evacuation System - Non-Alarm Audio

A. The fire alarm control unit shall provide non-alarm audio from an owner supplied paging and/or music source over the fire alarm evacuation speakers. This feature shall be an integral part of the fire alarm system, and shall use some or all of the audio components from the fire alarm evacuation system.

B. The fire alarm system and the non-alarm audio operation shall comply with NFPA 72 requirements for non-emergency purposes at a fire command center that is not constantly attended by a trained operator.

C. All fire alarm system hardware and software shall be U.L. listed for non-alarm audio use. The fire alarm system shall supervise for system hardware and field wiring faults while playing non-alarm audio over the evacuation speakers. Any hardware failure or speaker circuit fault detected when the system is playing non-alarm audio shall report a trouble on the fire alarm control unit. All audio components used for both the non-alarm audio and the fire alarm evacuation system shall be manufactured by the same supplier.

D. The non-alarm audio shall have two dedicated audio inputs to the fire alarm control unit. Terminal strip connections and an industry standard RCA receptacle shall be provided at the fire alarm control unit for terminating the owner's audio source. The fire alarm input shall be 600-Ohm impedance. The inputs on the fire alarm control unit shall be electrically isolated via an isolation transformer.

E. The fire alarm control unit shall accept industry standard "line level audio input" from the owner's non-alarm audio source. The fire alarm system hardware and software shall distribute the audio over the fire alarm evacuation speakers. The selection of which speaker zones to distribute the non-alarm audio to the building occupants shall be coordinated with the owner's representative.

F. The fire alarm control unit shall be able to make audio input level adjustments from the owner's non-alarm audio source. This adjustment will match the non-alarm audio source to the fire alarm input. After the audio levels are adjusted, the owner shall control the volume level from the non-alarm audio source.

G. The fire alarm system will have the capability to provide operator "keys" that will adjust the volume level of pre-assigned non-alarm audio zones. The volume level of non-alarm audio that is being broadcast to any audio zone will also be individually adjustable by time of day via a pre-specified schedule.

H. The non-alarm audio shall be the lowest priory audio on the fire alarm system. The non-alarm audio shall not interfere with any of the fire alarm emergency signals that may include live voice, pre-recorded emergency voice messages, or any alert tones. Switches shall be located on the fire alarm control unit to turn on or off the non-alarm audio system feature. The fire alarm control unit shall have LED lamps to indicate the ON vs. OFF status of the non-alarm audio feature. Speaker circuits that are actively broadcasting non-alarm audio will also be indicated by LEDs.

I. The non-alarm audio shall be synchronized throughout the fire alarm life safety system amplifiers and speaker circuits. Any remote amplifier panels located on the fire alarm system network shall also be synchronized. The system shall be capable of accepting a system-wide non-alarm audio input at the main fire alarm control or another local non-alarm audio input at a remote amplifier panel to serve only the areas served by that remote panel.

J. Multiple non-alarm audio sources must be accessible by the fire alarm non-alarm audio system. Each separate non-alarm audio source will have the ability to be broadcast into a distinct fire zone, depending on occupant preference. Any system restricted to a limited number of non-audio sources will not be accepted. The system must have the capability of broadcasting an unlimited number of non-alarm sources, except as determined by the number of individual fire zones served by the fire alarm system.

K. Non-alarm audio shall be automatically turned off in the event of primary power failure to the fire alarm control unit or any of the remote amplifier panels controlled by the main fire alarm control unit.

2.19 Emergency Communications/Mass Notification System

A. The system shall be a multi-purpose NFPA 72 compliant, supervised, Emergency Communication/Mass Notification evacuation system. The system shall provide up to an

eight channel voice evacuation system incorporating supervision during the broadcasting of emergency communications messaging. The system shall be an integral part of the fire alarm system and shall operate from a 120 VAC power source and have 24 VDC battery backup.

B. Standard on-board system features shall include: digital voice messaging, a hand-held push-to- talk microphone with override priority, and a power supply/battery charger.

C. The system shall be capable of interfacing with emergency system audio units via an industry standard audio input. The system shall have two dedicated audio inputs to the emergency communications system. Terminal strip connections and industry standard RCA receptacle jacks shall be provided at the fire alarm control unit for terminating the owner's provided audio source. The fire alarm input shall be 10 VRMS, 25 VRMS, 70.7 VRMS, line level (0.707 VRMS) or microphone (600-Ohm impedance). The inputs on the fire alarm control unit shall be electrically isolated via an isolation transformer.

D. All fire alarm system hardware and software shall be UL 2572 listed for Emergency Communications audio use.

2.20 Fire fighters' telephone communication system: Arrange system to use dedicated, two-way, supervised voice communication links between the FACU and remote fire fighters' telephone stations throughout the building.

2.21 NON-SYSTEM SMOKE DETECTORS

2.22 Single-Station Smoke Detectors:

A. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device.

B. Auxiliary Relays: One Form A and one Form C, both rated at 0.5 A.

C. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at 10 feet according to UL 464.

D. Visible Notification Appliance: 177-cd strobe as required per floor plans.

E. Heat sensor, 135 deg F (57 deg C) combination rate-of-rise and fixed temperature.

F. Test Switch: Push to test; simulates smoke at rated obscuration.

G. Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.

H. Quick-disconnect wiring harness.

I. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.

J. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.

2.23 Single-Station Duct Smoke Detectors:

A. Comply with UL 268A; operating at 120-V ac.

B. Sensor: LED or infrared light source with matching silicon-cell receiver.
1. Detector Sensitivity: Smoke obscuration between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) when tested according to UL 268A.

C. Detector shall be twist-lock mounted to a fixed base inside a duct mounted housing with associated electronic components. Provide terminals in the duct housing for connection to building wiring.
1. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.

D. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

E. Fan Shutdown Relay: Rated to interrupt fan motor-control circuit.

F. Provide a red alarm LED, a green power-on LED, a piezoelectric tone-alert silence switch, and a key switch for selecting normal operating mode or to initiate a test or reset operation all mounted to a stainless steel 2-gang electrical plate to be provided in a constantly attended location or located as per the AHJ.

G. Provide test port on duct housing for functional smoke testing access with cover in place.

2.24 ADDRESSABLE INITIATING

2.25 ADDRESSABLE MANUAL PULL STATIONS

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box and shall match color of device.

B. Description: Addressable double action type, red LEXAN. Station shall mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. Station shall be pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit. Where double-action stations are provided, the mechanism shall require two actions push top activation door to initiate an alarm.

C. Provide with a front showing red LED showing that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the station LED shall be on steady.

D. Indoor Protective Shield: Where required, or as indicated on the drawings, provide a factory-fabricated, tamperproof, clear LEXAN enclosure shield and red frame that easily fits over manual pull stations which shall be hinged at the top to permit lifting for access to initiate a local alarm. Unit shall be NRTL listed. Lifting the cover shall actuate an integral battery-powered audible horn intended to discourage false-alarm operation. 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.

E. Provide at locations as shown on the drawings an Institutional style manual station. The institutional style stations shall activate by a key operation only allowing access for manual alarms to be initiated by authorized personnel. Operation shall require key insertion and opening of the station cover.

F. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.26 ADDRESSABLE ANALOG SMOKE SENSORS

A. General Requirements for System Smoke Detectors:
1. Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
2. Factory Nameplate: Serial number and type identification.
3. Operating Voltage: 24 VDC, nominal and shall be two-wire type.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
5. 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. Provide terminals in the fixed base for connection to building wiring. 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. Sensors shall include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACU. Sensor address shall be located in base to eliminate false addressing when replacing sensors. Integral Addressable Module shall be arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit. Each sensor base shall contain an integral visual-indicating LED that will flash to provide power-on status each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base or Quick Connect Arrangement: Photoelectric sensor and electronics in a single piece construction which shall twist-lock onto a mounting base that attaches to a standard electrical box. Provide terminals in the fixed base for connection to building wiring. Sensors shall include an internal communication transmitter and receiver in the sensor having a unique identification and capability for status reporting to the FACU. Integral Addressable Module shall be arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit. Each sensor shall contain an integral visual-indicating LED that will flash to provide power-on status each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor LED shall be on steady. Sensor and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base.
6. Each sensor base shall contain a magnetically actuated test switch to provide for easy pre-certification 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. Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit. Provide multiple levels of detection sensitivity for each sensor.
9. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
10. The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI. Removal of the sensor head for cleaning shall not require the setting of addresses.
11. Bases: CO Sensor, relay output, sounder and isolator bases shall be supported alternatives to the standard base.

B. Addressable Sensor Bases

1. Standard base - Twist lock addressable base with address selection DIP switch accessible from front with sensor removed. Integral red LED for power-on (pulsing), or alarm or trouble (steady on). Locking anti-tamper design mounts on standard outlet box.
2. Sensor Base with remote device connection - All standard base features with wired connection for either a Remote LED alarm indicator or remote relay (relay is unsupervised and requires separate 24VDC)
3. Supervised Relay Bases - All standard base features and shall be available in either a 4-Wire Sensor Base to use with remote or locally mounted relay; requires separate 24 VDC, or as a 2-Wire Sensor Base to use with remote or locally mounted relay; no separate power required. Supervised relay operation shall be programmable and shall be manually operated from control panel.
4. Sensor base with built-in electronic alarm sounder - All standard base features and piezoelectric sounder shall provide high output (88 dBA) with low current requirements (20 mA). Sounder shall be synchronized via SLC communications or by the NAC if NAC powered, sounder shall operation shall be programmable and shall be manually operated from control panel.
5. 520 Hz Sensor base with built-in electronic low frequency sounder - All standard base features and piezoelectric sounder shall provide a low frequency 520 Hz Square Wave (85 dBA) with nominal current requirements (115 mA). Sounder shall be synchronized via SLC communications or by the NAC if NAC powered, sounder operation shall be programmable and shall be manually operated from control panel.
    a. Emitted tone shall be a 520Hz Square Wave signal in compliance with the requirements of the 2010 edition of NFPA 72 for sleeping areas.
    b. The 520Hz Sounder base shall be listed to UL 268 and UL 464, Audible Signal Appliances.

2.27 ADDRESSABLE DUCT SMOKE SENSOR

A. Standard Addressable Duct Smoke Sensor Unit. Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Duct housing shall include relay or relay driver as required for fan shutdown.

1. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
2. 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 independent of the sensor head for activation by other alarm initiating devices within the fire alarm system. Relay shall be mounted within 3 feet of HVAC control circuit.
3. Duct Housing shall provide a magnetic test area and Red sensor status LED and Duct Housing shall provide a relay control Yellow LED trouble indicator.
4. 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.
5. 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.
6. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
7. Each duct smoke sensor shall be provided with a Remote Test Station with an alarm LED and test switch.
8. Where indicated provide a NEMA 4X weatherproof duct housing enclosure that shall provide for the circulation of conditioned air around the internally mounted addressable duct sensor housing to maintain the sensor housing at its rated temperature range. The housing shall be UL Listed to Standard 268A.

B. Addressable In-Duct Mounted Smoke Sensors. Photoelectric type, for applications with controlled dust and humidity providing HVAC duct smoke sensing where sampling tube designs are not appropriate. In-Duct housing shall include relay or relay driver as required for fan shutdown.
1. Shall accommodate duct airflow from 0 to 4000 ft/min (0 to 1334.21 yard/min), and provide environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor by the FACU.
2. The In-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 independent of the sensor head for activation by other alarm initiating devices within the fire alarm system. Relay shall be mounted within 3 feet of HVAC control circuit.
3. Standard models shall be for rectangular ducts from 6” 5.98 inch square to 36” (35.98 inch) square with optional adapters available to allow use with round ducts of 6”, 8” (7.99 inch), 10” (10 inch) or 12” (12.01 inch) in diameter.
4. In-Duct Housing shall provide a magnetic test area and Red sensor status LED and In-Duct Housing shall provide a relay control Yellow LED trouble indicator.
5. 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. Each duct smoke sensor shall be provided with a Remote Test Station with an alarm LED and test switch.

C. Addressable Air Aspirating Duct Smoke Sensors. Photoelectric type smoke detection with an aspirating system shall provide remote sensor location for ducts with difficult service access. Detectors shall support remote housing up to 82ft with 1.05” OD rigid pipe; detectors

shall support remote housing up to 50ft with ¾" OD flexible tubing. Sampling tubes shall be provided per design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Duct Detection system shall be UL listed to Standards 268A, and ULC listed to Standard S529.

1. Environmental compensation, programmable sensitivity settings, status testing and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACU.
2. The Air Aspirating duct detection system shall supervise air flow through the duct housing and shall communicate trouble to the fire alarm control unit on a high or low air flow condition.
3. The Air Aspirating 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 and 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
4. Air Aspirating Duct Housing shall provide a magnetic test area and Red sensor status LED.
5. Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.
6. Each duct housing shall have remote functional smoke testing capability.
7. Each duct housing shall be supplied with a replacement air inlet filter.
8. Each duct housing shall have an optional water trap with a ball valve for draining to eliminate moisture buildup.
9. The Air Aspirating Detection system shall have an operating air velocity range of 0 to 4000 linear ft/minute) 0 to 1334.21 yards/minute.
10. The Addressable Air Aspirating Detection system shall be capable of use in other areas as open area detection where point type detectors are not practical, such as; prison cells in correctional facilities, transformer vaults, cable tunnels and MRI rooms.

2.28 ADDRESSABLE HEAT SENSORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Thermal Sensor Combination type: Fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; Actuated by either a selected fixed temperature or a rate of rise that exceeds a preset amount per minute unless otherwise indicated.

C. 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. Selectable rate compensated, fixed temperature sensing with or without rate-of-rise operation.

D. Mounting: Twist-lock base interchangeable with smoke-sensor heads.

E. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

F. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 135-deg F, 155-deg F or 190-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACU for either 15-deg F or 20-deg F per minute.

G. 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.

H. Unless otherwise indicated, sensors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for temperature by fire-alarm control unit.
1. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 degrees Fahrenheit per minute.
2. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135-deg F, 155-deg F or 190-deg F. (57, 68 or 190.4 degrees Fahrenheit.).

2.29 ADDRESSABLE CO SENSOR

A. Addressable CO Sensor
1. The CO Sensor shall be an addressable carbon monoxide (CO) sensing module providing both CO toxic gas detection and enhanced fire detection, and shall be listed to UL 268, Smoke Detectors for Fire Alarm Signaling Systems and UL 2075, Gas and Vapor Detectors and Sensors; allowing systems to be listed to UL 2034, Single and Multiple Station Carbon Monoxide Alarms.
2. The CO Sensor shall include CO sensor element mounted in the sensor base which can be easily replaced without replacing the complete sensor base assembly.
3. The CO Sensor base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
4. The CO Sensor base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
5. CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
6. The CO Sensor shall provide a 10 year life expectancy before replacement is necessary or required.
7. The CO Sensor base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.

B. Addressable CO Sensor Sounder Base
1. The CO Sensing element shall support operation with a Sounder base; the CO Sensor Sounder base shall provide temporal code 3 (TC3) for fire, or temporal code 4 (TC4) for toxic carbon monoxide alarms.
2. The CO Sensor Sounder base shall be listed to UL 464, Audible Signal Appliances.
3. CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
4. The CO Sensor Sounder Base shall include CO sensor element mounted in the sounder base which can be easily replaced without replacing the complete sensor base assembly.
5. The CO Sensor Sounder base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
6. The CO Sensor Sounder Sensor base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.

7. The CO Sensor Sounder base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.
8. The CO Sensor Sounder Base shall be interchangeable with the CO Sensor 520 Hz Sounder Base.

C. Addressable CO Sensor 520 Hz Sounder Base

1. The CO Sensing element shall support operation with a 520 Hz Sounder base; the 520 Hz CO Sounder base shall provide temporal code 3 (TC3) for fire, or temporal code 4 (TC4) for toxic carbon monoxide alarms.
2. Emitted tone shall be a 520Hz Square Wave signal in compliance with the requirements of the 2010 edition of NFPA 72 for sleeping areas.
3. The CO Sensor 520Hz Sounder base shall be listed to UL 268 and UL 464, Audible Signal Appliances.
4. CO sensor shall provide enhanced fire detection with the addition of two selectable modes of operation: Nuisance Alarm Reduction Mode and Faster Fire Detection.
5. The CO Sensor 520 Hz Sounder Base shall include CO sensor element mounted in the sounder base which can be easily replaced without replacing the complete sensor base assembly.
6. The CO Sensor 520 Hz Sounder base shall provide address selection in the base allowing the address to remain with its location when the sensor is removed for service or type change.
7. The CO Sensor 520 Hz Sounder base shall include an integral red LED to indicate the power-on, trouble, test mode or alarm status.
8. The CO Sensor 520 Hz Sounder base shall report the following CO Sensor troubles: Communication loss, Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), and Sensor Missing/Failed.
9. The CO Sensor 520 Hz Sounder Base shall be interchangeable with the standard CO Sensor Sounder Base.

2.30 ADDRESSABLE MULTI-POINT/MULTI-SENSOR/MULTI-CRITERIA SENSOR

A. Smoke and heat sensing shall be available to be combined in a single housing to provide smoke activity accurately monitored by photoelectric sensing technology and thermal activity accurately monitored by thermistor sensing technology.

B. A correlation algorithm of smoke activity and thermal activity shall be provided for intelligent fire detection earlier than with either technology activity alone but shall provide software and programming capabilities to help reduce nuisance alarms.

C. Individual sensor information shall be processed by the host fire alarm control unit to determine sensor status and to determine whether conditions are normal, off-normal, or alarm.

D. Analog information from each sensor type shall be digitally communicated to the control panel where it is to be analyzed. Photoelectric sensor input is to be stored and tracked as an average value with an alarm or abnormal condition being determined by comparing the sensor's present value against its average value. Thermal data is to be processed to look for absolute or rate-of-rise temperature as desired.

E. Monitoring each photoelectric sensor's average value shall provide a software filtering process that compensates for environmental factors (dust, dirt, etc.) and component aging, which shall provide an accurate reference for evaluating new activity. The intent of this process is to be a significant reduction in the probability of false or nuisance alarms caused by shifts in sensitivity, either up or down. Status indications of dirty and excessively dirty shall be automatically generated allowing maintenance to be performed on a per device basis.

F. Peak activity per sensor shall be stored by the host fire alarm control unit to assist in evaluating specific locations where the alarm set point for each sensor shall be capable of being determined at the control panel, and selectable as more or less sensitive as the individual application requires.

G. Alarm set points shall be programmed for timed automatic sensitivity selection (such as more sensitive at night, less sensitive during day). Control panel programming shall also provide multi-stage operation per sensor, for example a 0.2% level may cause a warning to prompt investigation while a 2.5% level may initiate an alarm.

H. Combination smoke and heat sensors Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 degrees Fahrenheit per minute. The fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 degrees Fahrenheit.

I. Bases: CO Sensor, relay output, sounder, 520 Hz Sounder, and isolator bases shall be supported alternatives to the standard base.

2.31 ADDRESSABLE CIRCUIT INTERFACE MODULES

A. Addressable Circuit Interface Modules: Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.

B. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box or be cabinet mounted using appropriate mounting to allow quick replacement. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required.

C. There shall be the following types of modules:
   1. Type 1: Monitor Circuit Interface Module:
      a. For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. This module will communicate status (normal, alarm, trouble) to the FACU.
      b. For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACU.
   2. Type 2: Line Powered Monitor Circuit Interface Module
      a. This type of module is an individually addressable module that has both its power and its communications supplied by the two wire signaling line circuit. It provides

location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACU.

b. This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.

3. Type 3: Single Address Multi-Point Interface Modules
   a. This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
   b. This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.
   c. This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.
4. Type 4: Line Powered Control Circuit Interface Module
   a. This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.
5. Type 5: 4-20 mA Analog Monitor Circuit Interface Module
   a. This module shall communicate the status of a compatible 4-20 mA sensor to the FACU. The FACU shall annunciate up to three threshold levels, each with custom action message; display and archive actual sensor analog levels; and permit sensor calibration date recording.
6. Type 6: Addressable Damper Controller
   a. Shall be an addressable interface assembly with monitor and control capability for damper status and activation control with all necessary terminal connections, addressable modules, mounting plate, base and cover.
   b. Shall be factory assembled, pre-wired, and shall meet NFPA 80 and 105 life safety remote damper testing requirements.
   c. Shall come with a standard with a 5" x 6" handy box with 3' power and blade indication switch leads and be designed for easy installation within 3 foot of a smoke or combination fire smoke damper.
   d. A 18 gauge twisted pair field wiring from the fire alarm system addressable SLC will provide control and monitoring of the damper assembly.

D. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the

module is powered and communicating with the FACU. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.32 ADDRESSABLE NOTIFICATION

2.33 ADDRESSABLE ALARM NOTIFICATION APPLIANCES

A. Addressable Notification Appliances: The Contractor shall furnish and install Addressable Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).

1. Addressable Notification appliance operation shall provide power, supervision and separate control of horns and strobes over a single pair of wires. The controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance's presence on the channel. The channel provides a digital command to control appliance operation. SLC channel wiring shall be unshielded twisted pair (UTP), with a capacitance rating of less than 60pf/ft and a minimum 3 twists (turns) per foot.
2. All Notification Appliances shall operate as a completely independent device allowing for specific location alerting of both fire alarm and Mass Notification functions. Each visible device (both clear fire alarm and amber mass notification) shall be capable of operating on multiple notification zones or completely separate from all other notification devices, this allows “On the fly” program operation changes for Mass Notification alerting and fire alarm notification.
3. All Notification Appliances shall operate as a completely independent device allowing for appliances in handicap accessible rooms and other locations to operate on the same SLC and to activate individually based on an alarm condition in a room or as part of a general alarm condition where all appliances activate together.
4. Individual Notification Appliances shall be able to be grouped into zones (or operational groups) by central programming at the main fire alarm control unit.
5. Notification Appliances shall provide for “unobtrusive” testing. Each Notification Appliance shall be tested for audible and visible operation on an individual basis at the device or from the main fire alarm control unit, allowing for minimal invasive impact.
6. Class B (Style 4) notification appliances shall be wired without requiring traditional in/out wiring methods; addressable "T" Tapping shall be permitted. Up to 127 addresses can be supported on a single channel.
7. Each Addressable notification appliance shall contain an electronic module and a selectable address setting to allow it to occupy a unique location on the channel. This on-board module shall also allow the channel to perform appliance diagnostics that assist with installation and subsequent test operations. A visible LED on each appliance shall provide verification of communications and shall flash with the appliances address setting when locally requested using a magnetic test tool.
8. Each addressable notification appliance shall have electrical test point access without removing the device cover.
9. Both wall mount and ceiling mount devices shall be available along with weatherproof devices.

B. Addressable Speaker: Addressable Speaker notification appliances shall be listed to UL 1480. Individual device level supervision and activation control shall be provided by the fire alarm control unit.

1. Speakers shall be individually powered, addressed, and controlled from a compatible fire alarm control unit Signaling Line Circuit (SLC) using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Shielded cable shall not be required.
2. Speakers shall provide for Fire Alarm and General Signaling functionality in a single unit, eliminating additional devices. Device "Self-Test" shall be supported by a compatible fire alarm control unit and shall be UL listed and NFPA 72 compliant. Speakers shall be UL listed to provide a 520Hz audio tone in compliance with NFPA 72 for sleeping areas.
3. The speaker audio shall be provided by a standard 25VRMS or 70.7VRMS audio circuit using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Supervision of this circuit shall be provided by the addressable speaker. Shielded cable shall not be required.
4. Speaker power taps shall be at a minimum of 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker shall have a minimum UL rated sound pressure level of 86dBA at 10 feet for the Standard Output version and 84dBA at 10 feet for the High Fidelity version.
5. Speakers shall be available in either "Standard Output" with a minimum frequency response of 400 to 4000 Hz or in "High Fidelity Output" with a minimum frequency response of 200 to 10,000 Hz. Standard Output speakers shall use a multi-tapped speaker for audio/tone notification.
6. Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as "ALERT" labeling.
7. The speaker shall install directly to a manufacturer provided surface back box/skirt. Box shall be of same material as speaker and match color of device. If indicated as semi-flush mounting, the speaker shall install directly to a 4" square, 2 1/8" deep electrical box. Extensions for these boxes shall not be required. Units shall be modular in design to allow for easy installation and for easy changing of device color and labeling.

C. Addressable 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. Addressable functionality controls visible operation, while the speaker shall operate on a 25VRMS or 70.7VRMS NAC.
   1. Operational functions and features of Addressable Speaker above shall apply to this section. Operational functions and features of Addressable Strobe above shall apply to this section.
   2. Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as "ALERT" labeling.
   3. The speaker shall install directly to a manufacturer provided surface back box/skirt. Box shall be of same material as speaker and match color of device. If indicated as semi-flush mounting, the speaker shall install directly to a 4" square, 2 1/8" deep electrical box. Extensions for these boxes shall not be required. Units shall be modular in design to allow for easy installation and for easy changing of device color and labeling.

D. Addressable Weatherproof Speaker: Addressable Weatherproof Speaker notification appliances shall be listed to UL 1480. Individual device level supervision and activation control shall be provided by the fire alarm control unit.

1. Speakers shall be individually powered, addressed, and controlled from a compatible fire alarm control unit Signaling Line Circuit (SLC) using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Shielded cable shall not be required.
2. Speakers shall provide for Fire Alarm and General Signaling functionality in a single unit, eliminating additional devices. Device "Self-Test" shall be supported by a compatible fire alarm control unit and shall be UL listed and NFPA 72 compliant.
3. The speaker audio shall be provided by a standard 25VRMS or 70.7VRMS audio circuit using Unshielded Twisted Pair (UTP) cable and T-taps shall be allowed for Class B installation reducing wiring costs and wiring distances. Supervision of this circuit shall be provided by the addressable speaker. Shielded cable shall not be required.
4. Speaker power taps shall be at a minimum of 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker shall have a minimum UL rated sound pressure level of 86dBA at 10 feet for the Standard Output version and 84dBA at 10 feet for the High Fidelity version.
5. Speakers shall be available in either "Standard Output" with a minimum frequency response of 400 to 4000 Hz or in "High Fidelity Output" with a minimum frequency response of 200 to 10,000 Hz. Standard Output speakers shall use a multi-tapped speaker for audio/tone notification.
6. Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as "ALERT" labeling.
7. The speaker shall install directly to a provided surface mount weatherproof back box. Extensions for these boxes shall not be required. Units shall be modular in design to allow for easy installation and for easy changing of device color and labeling.

E. Addressable Weatherproof 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 listed for indoor applications with strobe intensity selectable as 15 or 75 cd or UL 1638 listed for outdoor applications with strobe rated at 75 cd (WP75) or 185 cd (WP185). Addressable functionality controls visible operation, while the speaker shall operate on a 25VRMS or 70.7VRMS NAC.
1. Operational functions and features of Addressable Speaker above shall apply to this section. Operational functions and features of Addressable Strobe above shall apply to this section.
2. Wall mount appliances shall be available in White and Red and ceiling mount appliances shall be available in White, Red, and Black. Labeling shall be available as either "FIRE", "ALERT" or no labeling.
3. The speaker/visual shall install directly to a provided surface mount weatherproof back box. Extensions for these boxes shall not be required. Units shall be modular in design to allow for easy installation and for easy changing of device color and labeling.

F. Isolator Module: Isolator module provides short circuit isolation for addressable notification appliance SLC wiring. Isolator shall be listed to UL 864. The Isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square electrical box, without the use of special adapter or trim rings. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs. The following functionality shall be included in the Isolator module:
1. Report faults to the host FACU.

2. On-board Yellow LED provides module status.
3. After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.

G. Accessories: The contractor shall furnish the necessary accessories.

2.34 ADRESSABLE APPLIANCE SLC REPEATER

A. Addressable Repeater shall supervise channel (SLC) wiring and communicate with and control addressable notification appliances. The Repeater shall be a stand-alone panel capable of powering one (1) NAC SLC. The channel (SLC) shall be rated for 3 amps and support up to 127 addresses. Power and communication for the notification appliances shall be provided on the same pair of wires. It shall be possible to program the High/Low setting of the audible (horn) appliances by channel from the addressable controller.
1. The Repeater shall provide a constant voltage output to ensure NAC current and voltage do not vary whether the panel is operating on AC or battery. The output voltage during alarm conditions shall be 29 VRMS.
2. Addressable SLC notification appliance circuits shall be Class B, Style 4.
3. For Class B circuits, the Repeater shall support up to 4 Class B branches directly at its output terminals for one SLC.
4. The internal power supply and battery charger shall be capable of charging up two 12.7 Ah batteries internally mounted or 25Ah batteries mounted in an external cabinet.
5. The Repeater panel can be mounted close to the host fire alarm control unit or remotely.
6. The Repeater status shall be communicated to the host fire alarm control unit and locally indicated.
7. A 200mA auxiliary output shall be available
8. The Repeater shall be listed to UL 864

2.35 FIRE FIGHTERS' TELEPHONES

2.36 Telephone Hand Sets: High-impact plastic handset, heavy-duty coil cord, and hook switch; connected to the FACU by means of dedicated, supervised communication lines. Handsets have a dynamic receiver and a carbon transmitter, operating on 24VDC.

2.37 A black master telephone handset with a push to talk button and a flexible-coiled self-winding five (5) foot cord shall be provided and recessed within a protective unit-mounted enclosure at the command center.

2.38 Cabinet: Flush- or surface-mounted as indicated, 18-gage, minimum, painted steel with a latched hinged door with trim labeled "Fire Fighters' Phone." Size to accommodate handset and cord.

2.39 MAGNETIC DOOR HOLDERS

2.40 Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develop a minimum of 25 lbs. holding force.

2.41 Material and Finish: Match door hardware.

2.42 REMOTE LCD ANNUNCIATOR

2.43 Provide a remote LCD Annunciator with the same "look and feel" as the FACU operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys; Status LEDs and LCD Display as the FACU.

2.44 Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with four (4) programmable control switches and associated LEDs.

2.45 Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.

2.46 Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

2.47 The LCD shall display the following information relative to the abnormal condition of a point in the system:

A. 40 character custom location label.

B. Type of device (e.g., smoke, pull station, waterflow).

C. Point status (e.g., alarm, trouble).

2.48 Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACU.

2.49 DACT/IP/CELLULAR COMMUNICATOR TRANSMITTER

2.50 DACT/IP/Cellular communicator transmitter shall be listed to UL 864 for Central Station Service and be acceptable for use by the remote or central station.

2.51 Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for, or connected via TCP/IP or Cellular to a remote or central station. When contact is made with the remote or central station, signals shall be transmitted. If connecting by POTS and service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the remote or central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal. If service is by TCP/IP or Cellular and connection is lost, transmitter shall initiate the local trouble signal and a loss of connection shall be indicated at the central station.

2.52 Local functions of the DACT/IP/Cellular communicator transmitter shall include the following:

A. Configurable with a primary and secondary path.

B. Paths can use any of the external connections, telephone line, cellular, or LAN Ethernet connections.

C. 3G with 2G fall back cellular connection through the cellular module. Antenna extension kits for areas of poor connectivity.

D. Communications failure with the remote or central station or fire-alarm control unit.

2.53 Digital data transmission shall include the following:

A. Address of the alarm-initiating device.

B. Address of the supervisory signal.

C. Address or loss of power.

D. Low battery.

E. Abnormal test signal.

F. Communication bus failure.

G. To communicate using the ADEMCO Contact ID Alarm Communication

2.54 Secondary Power: Integral rechargeable battery and automatic charger.

2.55 Constant connection supervision and detects failures within 90 seconds for IP/Cellular connection.

2.56 RADIO ALARM TRANSMITTER

2.57 Transmitter shall comply with NFPA 1221 and shall be listed and labeled by an NRTL.

2.58 Comply with 47 CFR 90.

2.59 Description: Manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.

A. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.

B. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by Owner.

C. Normal Power Input: 120-V ac.

D. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.

E. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph (160 km/h) with a gust factor of 1.3 without failure.

F. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.

G. Antenna-Cable Connectors: Weatherproof.

H. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

2.60 Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

A. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.

B. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.

C. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.

D. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.

E. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.

F. Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

2.61 AUTOCALL SYSTEM INTERFACE

2.62 When a fire alarm system using existing Autocall XA loop devices requires expansion, the FACU shall be capable of interfacing to the XA loop via an interface module. This module shall allow the FACU to be selected to function as either the XA loop master controller (head end) or as a Data Gathering Panel as an intelligent device on the XA loop reporting to a remote master controller. Multiple XA Loop Interface Modules can be installed in the FACU allowing a variety of system expansion situations to be satisfied.

2.63 SYSTEM PRINTER

2.64 General: Provide a dot-matrix type, listed and labeled as an integral part of the fire alarm system.

2.65 EMERGENCY POWER SUPPLY

2.66 General: Components include battery, charger, and an automatic transfer switch.

2.67 Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24] hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm notification devices in alarm mode for a period of 15 minutes.

2.68 DEVICE GUARDS

2.69 Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

A. Factory fabricated and furnished by manufacturer of device.

B. Finish: Paint of color to match the protected device.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

3.02 Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

3.03 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:

A. Factory trained and certified personnel.

B. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.

C. Personnel licensed or certified by state or local authority.

3.04 EQUIPMENT INSTALLATION

3.05 Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke

detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, Ethernet drops, and all other necessary material for a complete operating system.

3.06 Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted. Coordinate with the AHJ on acceptance of removing existing system during facility un-occupied time before new system is installed or tested.

3.07 Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.

3.08 Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.

3.09 Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

3.10 Install manual station with operating handle 48 inches above floor. Install wall mounted audible and visual notification appliances not less than 80 inches above floor to bottom of lens and not greater than 96 inches above floor to bottom of lens.

3.11 Mount outlet box for electric door holder to withstand 80 pounds pulling force.

3.12 Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control units, duct smoke detectors.

3.13 Automatic Detector Installation: Conform to NFPA 72.

3.14 Ethernet Drop: A standard RJ-45 Ethernet connection to the owner’s Ethernet network shall be provided at each fire alarm control unit as part of the contract.

3.15 PREPARATION

3.16 Coordinate work of this Section with other affected work and construction schedule.

3.17 CONNECTIONS

3.18 For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

A. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

3.19 Make addressable connections with a supervised interface device to the following devices and systems, if included in the design. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

A. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.

B. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.

C. Smoke dampers in air ducts of designated air-conditioning duct systems.

D. Alarm-initiating connection to elevator recall system and components.

E. Alarm-initiating connection to activate emergency lighting control.

F. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.

G. Supervisory connections at valve supervisory switches.

H. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.

I. Supervisory connections at elevator shunt trip breaker.

J. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.

K. Supervisory connections at fire-pump engine control panel.

3.20 WIRING INSTALLATION

3.21 System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).

3.22 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.

3.23 Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

3.24 Mount end-of-line device in box with last device or separate box adjacent to last device for Class "B" supervision.

3.25 Ethernet Circuits:

A. Ethernet circuits shall be provided to the Fire Alarm Control Unit as shown on the plans.

B. Where a dedicated Fire Alarm Ethernet LAN is specified only Agency Listed Fire Alarm Ethernet hardware shall be installed.

C. The electrical contractor shall coordinate and ensure proper Ethernet connections occur at the fire alarm control unit and other designated equipment locations prior to system turnover.

3.26 IDENTIFICATION

3.27 Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.28 Install framed instructions in a location visible from fire-alarm control unit.

3.29 GROUNDING

3.30 Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.31 FIELD QUALITY CONTROL

3.32 Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

3.33 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:

A. Factory trained and certified.

B. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.

C. International Municipal Signal Association (IMSA) fire alarm certified.

D. Certified by a state or local authority.

E. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

3.34 Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

3.35 Inspection:

A. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.

B. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

3.36 Acceptance Operational Tests:

A. Perform operational system tests to verify conformance with specifications:
1. Each alarm initiating device installed shall be operationally tested. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity.
2. Test each Notification Appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
3. Test Fire Alarm Control Unit and Remote Annunciator.

B. Provide minimum 10 days notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction.

3.37 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.

3.38 Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use NFPA 72 Forms for documentation.

3.39 Final Test, Record of Completion, and Certificate of Occupancy:

A. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

3.40 DEMONSTRATION

3.41 Engage a factory-authorized service representative to train Owner's maintenance personnel and selected others to adjust, operate, and maintain fire-alarm system.

3.42 CLEANING AND ADJUSTING

3.43 Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

3.44 Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.45 TRAINING

3.46 Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel and selected others as specified below.

A. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours training per facility.

B. Schedule training with the Owner at least seven days in advance.

3.47 EVALUATION CRITERIA

3.48 The proposal response will be evaluated based upon the following best value criteria:

A. Ability to Meet RFP Requirements 5 Points

B. Thoroughness of Response 10 Points

C. Design Capabilities 10 Points

D. Product Capabilities 10 Points

E. References 5 Points

F. Warranty and Service Support Capability 10 Points

G. Staffing Approach 5 Points

H. Scope of Work 5 Points

I. Safety Approach 5 Points

J. Training Capability 5 Points

K. Quality Assurance 5 Points

L. Manufacturing Capacity 5 Points

M. Disaster Recovery Plan 5 Points

N. Central Monitoring Capability 5 Points

O. Cost 10 Points

3.49 Executive Summary

A. The seller shall provide an overview of their company. The summary should also include additional information demonstrating how your product and services are differentiated from the competition. Please include a one-page overview of the company including a summary of the ownership of the company.

3.50 Design Capability

A. The seller shall demonstrate capabilities to provide fire alarm system design services in the local area. The overview should include a summary of CAD resources and project configuration management techniques. New product development capabilities shall be demonstrated and a list of patent innovations is requested.

3.51 System Overview

A. The Seller shall provide a system overview for the proposed fire alarm equipment. Please include features and functions of the proposed:
   1. Fire Alarm Network
   2. Fire Alarm Panels
   3. Graphic User Interface (GUI)
   4. Initiating devices
   5. Notification devices

B. The seller shall detail other systems the proposed fire alarm system is capable of integrating to.

C. The Seller shall detail the fire alarm systems network diagnostic capability.

D. The seller shall describe recent fire alarm technology that can contribute to project installation cost savings, service efficiency, and ensure the highest levels of survivability.

3.52 References

A. The Seller shall provide four references. References must include equipment similar to the requirements included in this solicitation.

3.53 Warranty/Service Availability

A. The seller shall explain their local warranty and service capability that's available from the seller's local office. Warranty and Service Information shall include:
   1. Preventative Maintenance
   2. Local Trained Technicians
   3. Repair Parts
   4. A Strategy for resolving system malfunctions during business hours, non-business hours, and weekends
   5. A Process of tracking service calls and escalation of recurring problems.

3.54 Staffing and Management

A. The seller shall provide a description of their local office personnel.

B. The seller shall describe their local Project Management capability, Service and Installation Personnel.

C. The seller shall describe additional resources (i.e. Corporate, Manufacturing, Quality Assurance Resources).

3.55 Scope of Work

A. The seller shall describe their design and phasing approach on this fire alarm system upgrade project. Please describe your system design, project management approach, professional installation services, and technical installer support. Also, include a fire alarm system test procedure.

3.56 Safety

A. The seller shall explain why safety is important on this type of installation project. The Seller shall appoint an accountable safety foreman on this project. An overview of a safety plan must be described.

3.57 Training

A. The seller shall demonstrate their ability to meet both on-site and off-site fire alarm operation and maintenance training.

3.58 Quality Assurance/Quality Control Plan

A. The seller shall provide a Quality Assurance/Quality Control Plan.

B. Please provide the name of the project's site foreman and describe their assigned project responsibilities. The assigned foreman must be NICET certified for the installation and maintenance of fire alarm systems.

C. Please explain how quality is implemented in both Project Management and Technical Installation Support on this project. The seller shall provide start-up procedures, construction procedures, and close-out procedures for this fire alarm system upgrade project.

D. The seller's processes must be ISO 9001 and ISO 9002 compliant. The seller shall provide their UL Certificate of Registration.

E. Please explain how defect prevention is conducted both in your manufacturing facility as well as with your existing fire alarm customers.

F. Please describe how Software Quality Assurance (SQA) and product life cycle development work together in the various stages of a new product.

G. The seller must demonstrate two problem-solving examples that show how their field office and the seller's headquarter manufacturing personnel work together to solve a fire alarm issue.

3.59 Manufacturing Capacity

A. The seller shall explain an overview of their manufacturing capability.

B. The seller shall explain the technology used to manufacture and test small systems, large systems and high volume peripherals. In addition the seller shall provide an overview of additional manufacturing conducted at the facility.

C. The seller shall describe the facilities' throughput capacity on manufactured Printed Circuit Assemblies (PCA).

D. The seller shall provide a layout of the manufacturing facility and include graphics of selected manufacturing equipment in the factory.

3.60 Disaster Recovery Plan

A. The seller shall provide a description of their disaster recovery plan, including an example of how the plan was followed during an actual disaster situation.

3.61 Cost

A. The seller shall provide a complete turnkey price for design/build and installation of a retrofit fire alarm system.

3.62 Central Monitoring

A. The Seller shall provide around the clock electronic monitoring for trouble and alarm conditions. Please describe the process used to notify agencies and/or individuals if a condition occurs. Note any value added features such as redundancy or technology enhancements.

3.63 Security Integration to the Proposed Fire Alarm System

A. The seller shall provide an optional overview of a security access control platform that integrates to the proposed fire alarm system. The seller shall describe the variety of network solutions that are available for this security platform (i.e. dedicated fault tolerant network, Ethernet Network, Wide Area Network.)

END OF SECTION