

**ADDENDUM NO. 1**

to  
**CONTRACT DOCUMENTS**

for  
**NEW BUS PARKING / EXTERIOR PLAZA & CURTAIN WALL REPLACEMENT  
AT ABSEGAMI HIGH SCHOOL**  
located at 201 S. Wrangleboro Road, Galloway, NJ 08205

for the  
**GREATER EGG HARBOR REGIONAL HIGH SCHOOL DISTRICT**  
Mays Landing, Atlantic County, New Jersey

**Issued: February 9, 2024**

**FVHD PROJECT NO. 5369-5**

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**INTENT**

**This Document supersedes all conflicting and contrary information in said Contract Documents. Said documents are hereby amended in certain particulars as described herein after. Unless specifically noted or specified hereinafter all work shall conform to the applicable provisions of the Contract Documents. Bidders shall acknowledge receiving this document on the Bid Proposal Form.**

This Addendum includes four ( 4 ) pages and the following:

1. Addendum No. 1 (E Portion) as prepared by Gillan and Hartmann, Inc., dated 2/9/24 (2-pages).
2. Revised Bid Proposal Form (2-pages).
3. Revised Specifications: 238239.19, 260010, 260050, 260519, 260533, 265119, 283111.
4. Revised Drawing: G001.
5. New Drawings: E001, E101.

### **REQUESTS FOR INFORMATION (RFI'S)**

1. Question: We request that a Bidding Contractor Prequalified by NJDPMC in C059 - Road Construction & Paving OR C054-Site Work be allowed to bid this project directly as a Prime General Contractor. This would open up to a larger pool of bidders and competitive pricing.

Response: The DPMC Classifications noted below are revised and will be corrected in other documents referenced in this addendum.

#### **Prime Contractor with Subcontractors:**

C009 with C032 & C047

OR

C054 with C009, C032 & C047

OR

C059 with C009, C032 & C047

2. Question: We respectfully request an extension of time in order to allow subcontractors and suppliers sufficient time to prepare a complete and responsible proposal.

Response: An extension of time can not be approved.

3. Question: The specs call for us to name subs C032 & C047. The drawings say "see MEP drawing". There are no MEP drawings provided. Please clarify this work. Are we required to name these subs?

Response: The MEP Drawings are attached to this Addendum. The mechanical scope of work is indicated on the electrical drawings. Naming the C032 and C047 Subcontractors is required.

### **REFER TO DRAWINGS**

The following Drawings and/or Sketches are attached to this Addendum:

#### **DRAWING NO. TITLE**

G001 TITLE SHEET AND DRAWING INDEX

E001 ELECTRICAL LEGEND, ABBREVIATIONS, GENERAL NOTES, DETAILS, AND SCHEDULES

E101 ELECTRICAL LEGEND, ABBREVIATIONS, GENERAL NOTES, DETAILS, AND SCHEDULES

The following Drawings are new and/or to be revised or corrected as follows:

DRAWING NO. CHANGES AND CORRECTIONS

- G001 Delete the referenced drawing in its entirety and substitute with the enclosed revised drawing.
- E001, E101 Add the referenced new drawings to the bid documents.

**PROPOSAL FORM**

Delete the Bid Proposal Form in its entirety and substitute with the enclosed revised document.

**REFER TO SPECIFICATIONS**

**BID NOTICE**

Delete the ninth (9<sup>th</sup>) line in its entirety and substitute with the following:

Bids will be received for: Single Overall Contract (DPMC: C009 with C032, C047) OR (C054 with C009, C032 & C047) OR (C059 with C009, C032 & C047)

**PART 1 - SECTION 00100 - INSTRUCTIONS TO BIDDERS**

Page      Paragraph

00100-12 1.22, B Delete subparagraph "B" in its entirety and substitute with the following:

- B. The Bidder shall be a firm classified by the State of New Jersey - Division of Property Management and Construction for the following classification(s):

**Prime General Contractor**

**C009 - General Construction/Alterations and Additions**

and have subcontractor(s) for the following classification(s) of work:

**Subcontractors:**

**C030 - Plumbing**

**C047 - Electrical**

**OR**

**C054 - Site Work**

and have subcontractor(s) for the following classification(s) of work:

**Subcontractors:**

**C009 - General Construction/Alterations and Additions**

**C030 - Plumbing**

**C047 - Electrical**

**OR**

**C059 - Road Construction & Paving**

and have subcontractor(s) for the following classification(s) of work:

**Subcontractors:**

**C009 - General Construction/Alterations and Additions**

**C030 - Plumbing**

**C047 - Electrical**

**REFER TO PART 5 - MECHANICAL SPECIFICATION SECTIONS**

Delete and replace the following section in their entirety and substitute with the enclosed revised document:

Section 238239.19 - Wall and Ceiling Unit Heaters, 3-pages

**REFER TO PART 6 - ELECTRICAL SPECIFICATION SECTIONS**

Delete and replace the following section in their entirety and substitute with the enclosed revised documents:

Section 260010 - General Requirements Electrical, 47-pages

Section 260050 - Basic Electrical Materials and Methods, 10-pages

Section 260519 - Low Voltage Electrical Power Conductors and Cables, 6-pages

Section 260533 - Raceways and Boxes for Electrical Systems, 10-pages

Section 265119 - Led Exterior Lighting, 4-pages

Section 283111 - Modifications to the Existing Fire Alarm, 4-pages

**END OF ADDENDUM NO. 1**

**ADDENDUM NO. 1 (E portion)**

to the

**SPECIFICATIONS AND DRAWINGS**

for the

**NEW BUS PARKING / EXTERIOR PLAZA &  
CURTAIN WALL REPLACEMENT AT ABSEGAMI  
HIGH SCHOOL**

Located at

**ABSEGAMI - 201 S. WRANGLEBORO RD, GALLOWAY, NJ  
08205**



Gillan and Hartmann, Inc.

1. E Addendum No. 1 dated February 9, 2024, is issued as part of the Contract Documents, dated January 23, 2024 to inform and/or specify changes, which take precedence over information contained in the original Contract Documents. Unless otherwise specifically noted or specified hereinafter, or shown on drawings or schedules accompanying this Addendum, all work required by this Addendum shall conform to the applicable provisions of the Contract Documents. It shall be the responsibility of the Bidder to include in their bid any cost implications of this Addendum. All Bidders are to indicate on the form of proposal submitted by them, acknowledgment of receipt and compliance with the contents of this change to the Contract Documents.
2. Any provision in any of the Contract Documents which may be in conflict or be inconsistent with the contents of this Addendum shall be void to the extent of such conflict or inconsistency.

### 3. ELECTRICAL TRADE

#### 1.1 CLARIFICATIONS:

1.1.1. None.

#### 1.2 ERRATA IN THE SPECIFICATIONS

##### 1.2.1. Specifications Initial Issuance:

- 1.2.1.1. 238239.19 - Wall and Ceiling Unit Heaters
- 1.2.1.2. 260010 - General Requirements Electrical
- 1.2.1.3. 260050 - Basic Electrical Materials and Methods
- 1.2.1.4. 260519 - Low Voltage Electrical Power Conductors and Cables
- 1.2.1.5. 260533 - Raceways and Boxes for Electrical Systems
- 1.2.1.6. 265119 - LED Exterior Lighting
- 1.2.1.7. 283111 - Fire Alarm System Modifications

#### 1.3 ERRATA ON THE DRAWINGS:

##### 1.3.1. Drawings Initial Issuance:

- 1.3.1.1. E001 "ABSEGAMI HS - HVAC & ELECTRICAL REMOVALS AND NEW WORK
- 1.3.1.2. E101 "ELECTRICAL LEGEND, ABBREVIATIONS, GENERAL NOTES, DETAILS AND SCHEDULES"

END OF ADDENDUM NO.1

**ADDENDUM NO. 1**

**BID PROPOSAL FORM**

**SINGLE OVERALL CONTRACT**

DPMC Classifications: C009 Prime with C032 & C047 Subcontractors or  
C054 Prime with C009, C032 & C047 Subcontractors or  
C059 Prime with C009, C032 & C047 Subcontractors

Greater Egg Harbor Regional High School District  
Board of Education  
1824 Dr. Dennis Foreman Drive  
Mays Landing, NJ 08330

1. The undersigned, having familiarized himself / herself with the local conditions affecting the cost of the work, the drawings, the specifications and other Contract Documents, as in the Advertisement for Bids thereto, for the **New Bus Parking / Exterior Plaza & Curtain Wall Replacement at Absegami High School (FVHD#5369-5)**, 201 South Wrangleboro Road, Galloway, NJ 08205, together with all work incidental thereto, in accordance with the requirements of the drawings and specifications prepared by Fraytak Veisz Hopkins Duthie, P.C., Architects/Planners, Trenton, New Jersey, hereby proposes to furnish all labor, materials and equipment required for all Work and as follows:

**SINGLE OVERALL CONTRACT - BASE BID:** All Work at the above referenced school, including applicable Allowances - Section 01020, in accordance with the requirements of Contract Documents, for the sum of:

\$ \_\_\_\_\_  
Numerical

\_\_\_\_\_  
If written amount differs from the numerical figure, only the written amount will be accepted as the correct bid.

2. **Alternate Proposal(s) - Section 01030** shall be quoted as additions to, deductions from or No Change (NC) to the Base Bid and shall be in accordance with the specifications for Alternate Bid Work.

**Alternate Bid No. 1:**

**Replacement of Two (2) Ceiling Mounted Cabinet Unit Heaters**

ADD \$ \_\_\_\_\_  
(Numerical)

\_\_\_\_\_  
If written amount differs from the numerical figure, only the written amount will be accepted as the correct bid.

Submitted by: \_\_\_\_\_  
(Firm Name)

3. Bidder hereby acknowledges receipt of the following Addenda:

No Addenda Issued

<b>Addendum No. 1</b>	issued _____	received _____ (initial)
Addendum No. ___	issued _____	received _____ (initial)
Addendum No. ___	issued _____	received _____ (initial)
Addendum No. ___	issued _____	received _____ (initial)

4. In submitting this bid, it is understood that the right is reserved by the Board of Education to accept or to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of sixty (60) days from the date set of the opening thereof.

5. Bid Security in the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) in the form of \_\_\_\_\_ (Certified Check, Cashier's Check, or Bid Bond) is submitted herewith in accordance with the requirements of the specifications.

6. The undersigned is an individual ( )  
a partnership ( )  
a corporation ( ) under the laws of the State of \_\_\_\_\_,

having principal office in the \_\_\_\_\_ of \_\_\_\_\_, County  
of \_\_\_\_\_, and State of \_\_\_\_\_.

Respectfully Submitted,

\_\_\_\_\_  
(Company Name, if Bidder is a company)

BIDDER'S SIGNATURE

\_\_\_\_\_  
(Company Officer, if Bidder is a Corporation or LLC)

(Seal, if Corporation)

\_\_\_\_\_  
Printed or Typed Name Title of Officer (if the Bidder is a Company)

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State, Zip Code

\_\_\_\_\_  
Dated

\_\_\_\_\_  
Phone & Fax

\_\_\_\_\_  
Email Address

NOTE: SEE BIDDERS CHECKLIST

Submitted by: \_\_\_\_\_  
(Firm Name)



## **SECTION 238239.19 - WALL AND CEILING UNIT HEATERS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes wall and ceiling heaters with propeller fans and electric-resistance heating coils.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings:
  - 1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Include details of anchorages and attachments to structure and to supported equipment.
  - 3. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
  - 4. Wiring Diagrams: Power, signal, and control wiring.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For wall and ceiling unit heaters to include in emergency, operation, and maintenance manuals.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

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

1. Berko; Marley Engineered Products.
2. Chromalox, Inc.
3. INDEECO.
4. Marley Engineered Products.
5. QMark; Marley Engineered Products.

## **2.2 DESCRIPTION**

- A. Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.
- B. 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.

## **2.3 CABINET**

- A. Front Panel: Stamped-steel louver or Extruded-aluminum bar grille, with removable panels fastened with tamperproof fasteners.
- B. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.
- C. Surface-Mounted Cabinet Enclosure: Steel with finish to match cabinet.

## **2.4 COIL**

- A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection. Provide integral circuit breaker for overcurrent protection.

## **2.5 FAN AND MOTOR**

- A. Fan: Aluminum propeller directly connected to motor.
- B. Motor: Permanently lubricated, multispeed.

## **2.6 CONTROLS**

- A. Controls: Unit-mounted thermostat.
- B. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine areas to receive wall and ceiling unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. Install wall and ceiling unit heaters to comply with NFPA 90A.
- B. Install wall and ceiling unit heaters level and plumb.
- C. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

**END OF SECTION 238239.19**

## **SECTION 260010 - GENERAL REQUIREMENTS ELECTRICAL**

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## **PART 1 - GENERAL REQUIREMENTS ELECTRICAL**

### **1.1 GENERAL**

- A. The conditions of Divisions 00 and 01 apply to each and every Trade Contractor or other person or persons supplying any material or labor entering this building and/or site, either directly or indirectly. In the event of a conflict between Section 260010 and Divisions 00 and 01, the terms of Divisions 00 and 01 shall govern.
- B. One Building Trade, the Electrical Building Trade, will be covered by these General Requirements Electrical.
- C. For simplicity, this Building Trade will be referred to further herein as the Electrical Trade Contractor. The Electrical Specifications and all Electrical Drawings, together with all addenda make-up the Electrical Contract Documents, and are a part of the "Project Contract Documents", as described throughout these specifications.
- D. The term "Electrical Trade" as used in the Contract Documents, means the Electrical Building Trade.
- E. The term "indicated" means all information included, detailed, shown and/or implied on the Contract Documents.
- F. The term "existing" is used generally in reference to renovation projects. On new construction projects, the term "existing" is intended to mean work already in place.

### **1.2 SCOPE AND OBJECTIVES OF THE ELECTRICAL WORK**

- A. The Scope and Objectives of the Electrical Work of this Project include, but are not limited to:
  - 1. Refer to Division 01 for Scope of Work and of Alternate Bids;
  - 2. Periodic inspection of completed work and site conditions by the Electrical Trade Contractor's Project Manager to confirm compliance with contract documents and verify suitability to receive subsequent work;
  - 3. Remove the indicated devices shown on the removal plan. Clean and store the light fixtures to reinstall. Remove the fire alarm devices and modify the fire alarm system as required;
  - 4. Provide the new lighting control devices for the new storage room;
  - 5. Provide the new exterior light fixture outside the new exterior doors.

### **1.3 INTENT OF THE ELECTRICAL CONTRACT DOCUMENTS**

- A. The intent of the Electrical Contract Documents is to include all items and labor necessary for the proper execution and completion of the Work of the Electrical Trade Contractor. The

Contract Documents of all Trades are complimentary to each other; what is required by one shall be as binding as if required by all. Performance of the Electrical Trade Contractor is required only to the extent consistent with the Project Contract Documents and reasonably inferable from them as being necessary to produce the desired results.

- B. It is expressly stipulated that neither the Drawings nor the Specifications shall take precedence over the other, and it is further stipulated that the Design Professional may interpret or construe the Drawings and Specifications so as to secure in all cases the result most consistent with the needs and requirements of the work. In the event of such ambiguity or discrepancy, comply with the higher cost product (material plus labor), the more stringent requirement, and supply the better quality or greater quantity of work.

#### **1.4 PROPOSAL PREPARATION**

- A. Prior to submitting a pricing quotation/proposal, proceed as follows, and include the following:
  - 1. Visit the site, survey, record, confirm and include in the scope of work, all material and labor necessary to install the equipment and systems indicated. Use the Contract Documents as diagrammatic in nature, since they are not intended to show all details which may affect the electrical bid proposal.
  - 2. Include the work, as applicable, to remove and dispose of conduit, wiring, light fixtures, devices, equipment and appurtenances, not required for new work, unless otherwise indicated to be abandoned in place.
  - 3. Include all disconnections, removals and temporary provisions required to permit rigging, installation, connection, testing and operation of the new equipment. Include all such provisions whether or not shown, detailed or specified within technical sections of the Contract Documents.
  - 4. Include in the work, the following:
    - a. One Project Manager;
    - b. One Project Foreman.
  - 5. Detail, layout, coordination and fit of all of electrical equipment. Plan all disconnections, removals, offsets, temporary provisions, as required, to fit the new equipment into the space, and as required to accommodate maintenance accessibility and service access.
  - 6. Maintain and submit for approval, a written project schedule, on a weekly basis.
  - 7. Organize, administrate, control and log the RFI process for their respective trade. Where applicable, submit all RFI(s) for master RFI log maintained by Lead/Prime Contractor.
- B. In preparing a Bid Price:
  - 1. Thoroughly review and confirm all existing conditions and Contract Document information. Make note in writing of any exceptions, misunderstandings, unclear areas, unclear directions, and any aspects which will prohibit completion of the work, in total. Failing to supply such notice, all bidders will be accountable for having accepted all conditions at the site which affect their work and their costs. By submitting a bid price, all Trade Contractors certify that the Contract Documents have been thoroughly

reviewed and are sufficient for construction, and that the bidding Trade Contractors have adequate information to establish and determine their responsibility for materials, methods, costs, and schedule for their work.

2. Incorporate all requirements of all sections of the Contract Documents.
3. Include the following with the Manufacturer's and Sub-Contractor's Lists:
  - a. The name and telephone number of all Sub-Contractors.
  - b. The manufacturer and model numbers of all equipment proposed by the bidder and as listed on all of the equipment schedules and specified in the Contract Documents.
  - c. Identify each subcontractor and manufacturer. Include reference to article number.

### **1.5 HAZARDOUS MATERIALS**

- A. The use of asbestos, PCB's or any material or product containing hazardous materials in the performance of this contract is not permitted. Certify, in writing, that no hazardous material or product containing a hazardous material, has been furnished or installed.

### **1.6 DRAWINGS AND SPECIFICATIONS**

- A. It is the intent of the specifications and drawings to include under each item all materials, apparatus and labor necessary to properly install, equip, adjust and put into perfect operation the respective portions of the installations specified and to so interconnect the various items or sections of the work as to form a complete and properly operating whole.
- B. Any apparatus, machinery, small items not mentioned in detail which are necessary to complete or perfect any portion of the installation in a substantial manner and in compliance with the requirements stated, implied or intended must be furnished and/or installed without extra cost to the Project. This includes all materials, devices or methods peculiar to the machinery, apparatus or systems furnished and/or installed by the Electrical Trade Contractor.
- C. In referring to drawings, figured dimensions take precedence over scale measurements. Verify all wall locations, ceiling heights, elevations, dimensions, etc. on the architectural drawings, where applicable. Discrepancies must be referred to the Design Professional for decision. Certify and verify all dimensions, routings and layouts in the field and on the coordination drawings before ordering material or commencing work.
- D. Any work called for in the specifications, but not mentioned or shown on the drawings, or called for on the drawings, but not mentioned in the specifications, must be furnished and/or installed as though called for in both.
- E. When any device or part of equipment is herein referred to in the singular number, such as "the pump" such reference is deemed to apply to as many such devices as required to complete the installation.



- F. The term "Provide" means "Furnish and Install". Neither term will be used generally in these specifications, but will be assumed. The term "Furnish" means to obtain and deliver to the job site for installation by other trades.

## **1.7 LAWS, ORDINANCES, REGULATIONS AND PERMITS**

- A. The entire electrical system in all and/or in part must conform to all pertinent laws, ordinances and regulations of all bodies having jurisdiction, notwithstanding anything in these drawings or specifications to the contrary.
- B. Pay all fees and obtain and pay for all permits and inspections required by any authority having jurisdiction in connection with the work under this contract.
- C. Electrical work performed by the Electrical Trade Contractor must comply with the requirements of the National Electrical Code, NFPA and other boards and departments having local jurisdiction. Obtain and pay for all Electrical Inspections by local, municipal and state approving agencies. Inspections performed by the local inspector do not substitute for obtaining Independent Inspection by an authorized independent Electrical Inspection Agency.
  - 1. Qualifications: The EIA is to be an independent company from the Electrical Trade Contractor, registered with the State and a Master certified member of the International Association of Electrical Inspectors.
  - 2. Prepare and submit for review and comment to the Design Professional a schedule of inspections to be performed in coordination with the construction schedule.
  - 3. At a minimum, inspections shall be performed at the Rough-in, Progress and Final levels.
  - 4. The EIA shall submit written report for each level of inspection to the Design Professional to document compliance with current code requirements, including deficiencies and associated required remedial action.

## **1.8 CONNECTIONS TO UTILITIES**

- A. Apply for and obtain services from Utility Companies and municipalities. All charges for which Utility Companies and municipalities must be reimbursed must be paid for by the Electrical Trade Contractor at no additional cost to the Project.

## **1.9 TESTS**

- A. The following requirements are supplementary to tests specified for individual equipment or systems in other specification sections. Give written notice of date of test in ample time to all concerned.
- B. Concealed or insulated work must remain uncovered until all required tests have been completed; but if construction schedule requires, arrange for partial tests on portions of systems as approved. If a Prime Contractor covers or directs a Sub-Contractor to cover electrical work prior to completing the required tests, the Prime Contractor is responsible for any additional costs related to completing the required tests.

- C. As soon as conditions permit, conduct preliminary tests of equipment to ascertain compliance with specified requirements. Make needed changes, adjustments and/or replacements as preliminary tests may indicate, prior to acceptance tests.
- D. Conduct pressure, performance and operating tests as specified or required for each system or piece of equipment installed, modified or affected under this contract in presence of the Design Professional or Owner as well as a representative of agencies having jurisdiction.
- E. Obtain Certificates of Approval and/or Acceptance as specified or required in compliance with regulations of agencies having jurisdiction. Work will not be deemed complete until such Certificates have been delivered to the Design Professional.
- F. Prove conclusively, by testing, that electrical systems operate properly, efficiently and quietly in accordance with intent of drawings, specifications and most widely used construction practices.

#### **1.10 CLEANING**

- A. Be responsible for the following:
  - 1. Removal of all lumber, refuse, metal, piping and debris from site resulting from electrical work.
  - 2. Cleaning drippings created by the electrical work, from finished work of other Trades.
  - 3. Cleaning, polishing, waxing of electrical work as required.
- B. After testing, and acceptance of all work by the Design Professional and the Owner, thoroughly clean all electrical equipment and material to the satisfaction of the Design Professional.

#### **1.11 INSTRUCTING OWNER'S PERSONNEL**

- A. After all tests and adjustments have been made, fully instruct the representatives of the Owner in all details of operation of the equipment installed under the Electrical Contract Documents.
- B. Operate electrical equipment for sufficient length of time to satisfy Design Professional that requirements of Contract Documents have been fulfilled.
- C. Prepare digital recording of each Owner training session on compact disc.

#### **1.12 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. Provide in accordance with Division 01.
- B. Submit digital format PDF of Operating and Maintenance Instructions to the Design Professional for review and processing.

- C. Upon completion of the Design Professional's review and processing of digital format PDF of the Operating and Maintenance Instructions, submit three (3) copies of the final version of the printed instructions to the Owner. Bind instructions in separate, hardback, 3-ring loose leaf binders.
- D. Prepare instruction books by sections and include detailed Operating and Maintenance Instructions for all components of all systems, including wiring, and piping diagrams necessary for clarity. Identify the covers with the name of the project and the words "Operating and Maintenance Instructions - ELECTRICAL".
- E. Each section must have labeled tabs and be clearly marked with equipment or system name and contain detailed parts list data, ordering information therefore and the name, address and telephone number of the closest supply source.
- F. All instructional data must be neatly and completely prepared to the satisfaction of the Design Professional.
- G. Provide complete copy of all warranties in separate tab with the binder.
- H. Provide copies of the as-built drawings in the manuals.
- I. Provide copy of each submittal for each piece of equipment on the project, complete with all tag numbers, Contractor's Transmittal Cover Sheet and Design Professional's final Submittal Review Sheet.
- J. Provide compact disc of Owner training sessions with the manuals.
- K. Provide complete copy of the Electrical System Commissioning Report.

### **1.13 GUARANTEE**

- A. All material, equipment and workmanship must be in first class operating condition in every respect at time of acceptance by Owner. Acceptance by the Owner will be by letter written to the Electrical Trade Contractor.
- B. Unconditionally guarantee in writing all materials, equipment and workmanship for a period of one (1) year from date of acceptance by Owner. During the guarantee period, repair or replace, at the Electrical Trade Contractor's expense, any materials, equipment or workmanship in which defects may develop and provide free service for all equipment and systems involved in the contract during this guarantee period. Beneficial use of any system by any of the Trade Contractors during construction does not constitute acceptance by the Owner. Time period of this beneficial use cannot be included in the guarantee period.
- C. Guarantee must also include restoration to its original condition of all adjacent work that is disturbed in fulfilling this guarantee.
- D. All such repairs and/or replacements must be made without delay and at the convenience of the Owner.

- E. Guarantees furnished by Trade Contractors and/or equipment manufacturers must be counter-signed by the related Trade Contractor for joint and/or individual responsibility for subject item.
- F. Manufacturers' equipment guarantees or warranties extending beyond the guarantee period described in item B above must be transferred to the Owner along with the Trade Contractor's guarantees.

#### **1.14 ENTRANCE OF EQUIPMENT**

- A. Determine the method of equipment entrance during initial site visit prior to bidding. Do not scale building openings, door widths and equipment or component sizes off the drawings. Determine sizes from site measurements and the equipment manufacturer. Include cost of equipment manufacturer's knockdown, use of field assembled equipment, field assembly, all work required for access, removals, replacements, general construction, and the like, as required. During preparation of submittals, verify whether knocked-down or pre-disassembled equipment have been proposed all to the extent required to permit entry of equipment to final location. Verify that the use of field assembled (not pre-assembled) equipment complies with manufacturer's warranty, guarantee, listings and requirements.
- B. Perform all necessary rigging required for completion of electrical work.
- C. Deliver products to the site properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Deliver products and equipment to the site properly weatherproofed.
- D. The Trade Contractor who furnishes or purchases the product or equipment is responsible to provide and maintain protection from the weather, dust, dirt, construction debris, etc. until the project is complete.
- E. For all products and equipment which, when installed, have an opening into the building must be provided with a plywood cover, or similar protection, to prevent debris, rain, etc. from entering the building. The Trade Contractor who installs the product or equipment is responsible for such protection beginning at the time of installation.

#### **1.15 VISIT TO SITE**

- A. Due to the nature of the work involved under these Contract Documents, all bidders are required to thoroughly examine the site. Coordinate and schedule all site visits with the Owner.
- B. Thoroughly review Contract Documents prior to visiting the site, take Contract Documents to site and thoroughly explore to any extent necessary, the existing conditions as relating to fulfilling the requirements of these Contract Documents.
- C. If discrepancies are noted between requirements of Contract Documents and existing conditions, Trade Contractors must so indicate to Design Professional during bidding period

and receive clarification before bidding. Failure to comply with this requirement will result in Design Professional's interpretation during the construction period such that the Design Professional's decision will be final and binding as the sole interpreter of the contract requirements.

- D. Extras will not be considered for any work relating to connections with existing systems or adaptability of new systems to existing structures.
- E. Submission of proposals will be considered evidence that Trade Contractors have complied with the requirements of this Article.

#### **1.16 REQUESTS FOR INFORMATION, RFI(s)**

- A. Manage RFI(s) in a formal manner. Preparation and submission must comply with the process specified herein to be of maximum benefit to the project. Prepare, manage, and maintain an RFI Log. RFI(s) which do not comply with this process will be returned without comment.
- B. All RFI(s):
  - 1. Must be submitted in written form to the party designated at the construction phase kick-off meeting;
  - 2. Must be consecutively numbered, dated, and logged as directed, during the kick-off meeting;
  - 3. Those which are follow-up RFI(s), must use the same RFI number, with a sequential submission number;
  - 4. Must list the RFI number of any reference RFI(s) used in the narrative;
  - 5. Must present: background; related drawings; specification articles; room, space locations (as designated on Contract Documents including wing, column line designation, floor designation, and/or north, south, and the like), and must be presented as complete, clearly written thoughts, in legibly printed or typed form;
  - 6. Must be completed by the Electrical Trade Contractor's Designated Project Foreman, under the control and overview of the Electrical Trade Contractor's Project Manager;
  - 7. Must include Electrical Trade Contractor's Project Foreman's suggested resolution to RFI;
  - 8. Must evidence a high level of fluency with the Contract Documents, all job progress correspondence, all Addenda, all Construction Bulletins, and specifically the Mechanical/Electrical Specifications including: all specifications.
- C. The Electrical Trade Contractor's designated Project Manager must demonstrate familiarity with and responsibility for all RFI(s) prepared by the Project Foreman and must periodically submit an initialed log of RFI(s) signifying control of RFI(s) relating to specification and job scope issues.
- D. Issues relating to job scope, work included, methods and means which are either clearly discernable from the Contract Documents and/or clearly the responsibility of the Electrical Trade Contractor must be answered by his Project Manager and resolved between the Foreman and Project Manager prior to resorting to written RFI(s). The work of the Project Manager must evidence: fluency with the methods and means anticipated by the Electrical

Trade Contractor during the bid phase to plan and complete the work; fluency with the Contract Documents, and all administrative issues related thereto.

- E. Items or issues which relate to non-compliance to associated codes or regulations must reference code interpretations or the published adopted code or regulation. The reference must be either an excerpt of the code or regulation, published addenda to the code or regulation, a formal interpretation written by a representative of the associated agency, or letter of non-compliance from the Authority Having Jurisdiction. All cited code requirements must include the applicable code title, code version or date, and code section number designation. If the RFI does not contain the required information, the RFI will be returned without comment.

#### **1.17 AS-BUILT DRAWINGS**

- A. Prepare reproducible (paper) and electronic (cd) record documents in AUTOCAD .dwg format (Version 2000 or later) in accordance with the requirements in Division 01. Use commercial CAD drafting service if Electrical Trade Contractor does not have CAD capabilities in-house. As an option, if requested by the Electrical Trade Contractor, an electronic copy (AutoCad .dwg format) of any of the Electrical Contract Drawings may be provided by the Design Professional at a cost of \$250.00, paid in advance, to the requesting Contractor. In addition to the requirements specified in Division 01, indicate the following installed conditions:
  - 1. Indicate actual inverts and horizontal locations of underground electrical transmission and distribution equipment, and the like.
  - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines and annotated with permanent equipment number approved by Owner. Include code and equipment service clearances.
  - 3. Approved substitutions, Addenda and Bulletin Contract Modifications, and actual equipment and materials installed.
- B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located, as specified in Division 01, to record the locations and invert elevations of the underground electrical work.

#### **1.18 SERVICING OF EQUIPMENT AND SYSTEMS**

- A. After work has been completed in accordance with the Contract Documents, and prior to final acceptance tests, each Trade Contractor must have manufacturers or their authorized agents of the equipment installed, completely check their equipment and put equipment into proper operation. In each case, the respective Trade Contractor must have the manufacturers thoroughly check the complete installation of the equipment, furnished by the manufacturer, for proper and correct operation under the service intended.
- B. Six months after final acceptance of the work under the Contract Documents, each of the Trade Contractors must have the manufacturers again check their equipment for proper operation and lubrication. Coincidentally, these Trade Contractors must assure that the Owner is properly instructed in the servicing of the equipment.

- C. Prior to expiration of the guarantee period, each Trade Contractor must check all equipment, materials and systems for which he is responsible, make necessary adjustments and/or replacements, and leave systems in first class operating condition.

**1.19 SERVICING OF EQUIPMENT AND SYSTEMS (EXISTING/UNMODIFIED)**

- A. Selected, designated existing electrical systems and equipment are planned to be continued in service upon project turnover, with no specified repair/modification covered under the Contract Documents. The Owner reserves the right to request repair/maintenance labor and materials, as an Owner requested change, depending on the results presented in the Electrical Trade Contractor's Evaluation Report.
- B. Perform inspection, evaluation, start-up and testing of the electrical systems and equipment listed below or as specified in Division 26, and prepare a full Electrical Evaluation Report listing: defects; deficiencies; required maintenance/repair labor and materials, all as required to restore unmodified systems and equipment to safe reliable code compliant use:
  - 1. Add systems here.
- C. Include within the Electrical Evaluation Report, a detailed breakdown of the proposed additional material and labor required to complete the recommended restoration(s).

**1.20 EXCAVATION AND BACKFILLING**

- A. Perform all excavation, backfilling and pumping necessary for completion of electrical work. All excavation is considered classified.
- B. Remove from premises or deposit as directed by Design Professional all material excavated and not required or suitable for backfilling.
- C. Carefully remove and store topsoil, shrubbery and sod until underground work is complete and trenches are backfilled and then re-install. Replace any damaged items to the satisfaction of the Engineer.
- D. Allow adequate cover over piping and conduit in trenches as applicable. Trench walls must be perpendicular to the top of piping and conduit and trench bottoms must be instrument graded in the direction of flow as required. Pipes and conduits less than 6-inches in outside diameter which do not require sloping, shall have hard trench bottoms and shall be supported on undisturbed subgrade. Trench bottoms for sloping utilities, pipes and conduits over 6-inches in outside diameter shall be excavated 6-inches deeper than elevation and a 6-inch thick tamped bedding shall be installed. Bedding shall be naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- E. Provide sheathing, shoring and bracing necessary to complete excavation and backfilling work and exercise every precaution necessary to prevent accident, injury or death to any human

and damage to property of others. Remove all debris, sheathing, shoring and bracing upon completion of work.

- F. It is the responsibility of each Trade Contractor to check with the various Utility Companies and make the necessary arrangements to avoid damage to their property. Each Trade Contractor is responsible for damage during excavation to existing underground structures including, but not limited to electric, structural, piping or equipment. Such damage must be repaired promptly without cost to the Project. Do not dig until all underground utilities are identified and located.
- G. Backfill after inspection and approval. Backfill must be made with clean earth, free from rocks, frozen particles, debris or other foreign materials. Deposit in uniform layers not over six inches (6") thick with each layer mechanically tamped before the next layer is applied. When approved backfill material is not available from the site, each Trade Contractor, at no additional cost to the project, must provide additional select backfill to complete installation. Partial backfill on piping leaving all joints exposed is mandatory for all underground gas and underground domestic water systems. Final backfill only after testing procedures have been approved.
- H. All trenches that pass under wall foundations must be backfilled with lean concrete, full height, directly under wall footing, and at a 1:1 slope away from wall or column footing. Trenches that are parallel with and deeper than wall foundations must be backfilled with lean concrete on a 1:1 slope away from the bottom of the wall or column footing.
- I. Perform all cutting and patching to driveways, sidewalks, curbs, bituminous paving, walls, and the like, required by performance of excavation and backfilling. Install and maintain temporary paving as directed by Design Professional. Make repairs to sidewalks in complete blocks, partial patching will not be acceptable. Provide all materials for patching in strict accordance with applicable Articles of Divisions 01 through 33 of the Contract Specifications. All patching to match adjacent construction.
- J. Where rock is encountered during installation of underground piping systems, carry trenches to a point six inches (6") below invert of pipe and provide a six inch (6") layer of crushed stone or gravel as a cushion.
- K. All excavation work must include all pumping equipment, materials and labor necessary to keep all excavations free of water. Provide well points as required with disposition of water as directed by Design Professional.
- L. Provide suitable indemnity for all accidents to humans, animals or equipment caused by excavating and backfilling work. Provide suitable guards, barricades, red lanterns, flares and take the necessary precaution for an approved and safe installation. All trenches must be backfilled at the end of each working day. Where a trench must be left open, provide coverings of adequate size and strength over entire open area.
- M. Detectable Warning Tape: Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6-inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with



metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Oil, gas and dangerous materials.
3. Orange: Telephone and other communications.

- N. Trade Contractors shall engage the services of a Utility Identification Sub-Contractor to identify all existing underground utilities in the path of the proposed trench excavation. It shall be the Utility Identification Sub-Contractor's sole responsibility to search, investigate, test and identify existing underground utilities such as, but not limited to the following: gas piping, water piping, steam piping, condensate piping, electrical lines, sanitary piping, storm water piping, data, telephone, fiber optics and any other utility service, piping, lines or trenches. Before excavation can begin, the Trade Contractors shall provide all utility data concerning the underground utilities to Design Professional, and Owner. Data shall be in the form of a scaled drawing of the proposed excavation with all utilities clearly indicated.

#### **1.21 CONTINUITY OF SERVICES**

- A. Generally, no actions can be taken by the Electrical Trade Contractor that will interrupt any of the existing building services for these buildings or any other building until previously arranged and scheduled with the Design Professional and Owner.
- B. Should any service be interrupted by the Electrical Trade Contractor, immediately provide all labor, including overtime if necessary, and all material and equipment necessary for restoration of such service, at no additional cost to the Project.

#### **1.22 CONTINUITY OF INTERIOR BUILDING SERVICE UTILITIES**

- A. For the purposes of this specification section, "Building Service Utilities" include, but are not limited to:
1. Exterior: electrical; domestic water; fire protection water; sanitary; storm; chilled water; space heating water; fuel lines; communication cable; fire alarm; remote metering lines; telemetry lines; and the like;
  2. Heating piping systems, complete;
  3. Chilled water piping systems, complete;
  4. Heating and process steam/condensate systems, complete;
  5. Ductwork systems, complete;
  6. Medical gas systems, complete;
  7. Fire protection systems, complete;
  8. Control systems, complete;
  9. Plumbing, drainage and storm systems, complete;
  10. Process piping systems, complete;
  11. Electrical conduit and wiring systems, complete;
  12. Electrical lighting and wiring devices, complete;
  13. Electrical fire alarm and security systems, complete;

14. Electrical communication systems, complete.

- B. Plan work and schedule to prevent interruption of all Utility System Services. Refer to the "Scope and Objectives of the Electrical Work," of this Section for a description of: unmodified systems, unmodified equipment; spaces wherein mechanical and electrical systems are unmodified; and Utility System Services external to the individual building or buildings addressed by the work of this project.
- C. Plan work and schedule installation and connections of all Utilities to minimize or prevent interruption of all Utility System Services. Refer to "General Requirements Electrical," Article "Scope and Objectives of the Electrical Work."
- D. The work required for continuity of these systems on this project includes, but is not limited to, providing all labor and material required for: site investigation/verification; disconnect; removal; rerouting; reconnection; as-built drawing documentation; testing and check out of mechanical and electrical services serving equipment which are implied to be, or specifically indicated to be, continued in operation.
- E. All materials required for relocation work must comply with these specifications. Carefully review all phasing drawings, all Construction Trade drawings, and complete all necessary and prudent site visits to become familiar with all existing building operations, systems and equipment which may be continued, independent of the work of this project, and include all required relocation work described in this section.

### **1.23 TEMPORARY FACILITIES, UTILITIES AND HEATING**

- A. Refer to the general construction contract documents of these specifications.

### **1.24 SMOKE AND FIRESTOPPING (GENERAL)**

- A. Furnish and install a material or a combination of materials to form an effective barrier against the spread of flame, smoke and gases, and to maintain the integrity of the "fire and/or smoke" rated construction. Refer to the general construction contract documents. Fire and smoke rated construction is identified on the general construction contract documents. Provide firestopping in the following locations:
  - 1. Pipe and conduit penetrations through above grade floor slabs and through "fire and/or smoke"-rated partitions and fire walls.
  - 2. Penetrations of vertical shafts including, but not limited to pipe chases, duct chases, elevator shafts, and utility chutes.
  - 3. Other locations where indicated or required.
- B. Prepare submittals and submit for approval. Include manufacturer's descriptive data, typical details, installation instructions and the fire/smoke test data and/or report as appropriate for the time rated construction and location. The fire/smoke test data must include a certification by a nationally recognized testing authority that the material has been tested in accordance with ASTM E 814, or UL 1479 fire tests.

- C. Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, and protect from damage and exposure to elements. Damaged, deteriorated or outdated shelf life materials shall not be used and must be removed from the site.

## **1.25 COORDINATION DRAWINGS**

- A. The HVAC Trade Contractor will initiate preparation of coordination drawings, control original reproducibles, collect, organize and facilitate the work/input of General Contractor and all other building trades relative to the 100% final submission of the coordination drawings. Prepare coordination drawings in accordance with Division 1 to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Use proposed equipment submittals, which include certified dimensions, service clearances, etc., to prepare the coordination drawings. If equipment is submitted for review after completion of the coordination drawings and rejected during the submittal review process, because the equipment fails to meet the project specifications, the HVAC Trade Contractor is responsible to revise the coordination drawings and layout the work using equipment which meets the project specifications. HVAC Trade Contractor will designate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  - 1. Proposed locations of conduit, pull boxes, equipment, and materials. Include the following:
    - a. Maximum physical separation to meet National Electrical Code requirements for feeder and secondary transformer tap lengths.
    - b. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
    - c. Equipment connections and support details.
    - d. Exterior wall and foundation penetrations.
    - e. Fire-rated wall and floor penetration.
    - f. Sizes and location of required concrete pads and bases.
  - 2. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  - 3. Floor plans, elevations, and details to indicate penetrations in floors, walls and ceilings and their relationship to other penetrations and installations.
  - 4. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling mounted items.
  - 5. The foregoing information and coordination work must be provided by the applicable Trade Contractor using the coordination drawings as initiated by the HVAC Trade Contractor.
  - 6. The HVAC Trade Contractor must submit completed coordination drawings for record purposes, not for technical review and approval, but as proof that the coordination

drawings have been completed. The coordination drawings must be completed and submitted for record in advance of submission of sheet metal shop drawings.

- B. Coordinate with, and provide to the HVAC Trade Contractor, all electrical system and equipment information, locations and clearances required to prepare the coordination drawings.

**1.26 TRADE CONTRACTOR'S CERTIFICATION**

- A. Upon final completion of all work, each Trade Contractor must provide a notarized letter on Corporate letterhead, executed by a Corporate Officer, or Company Partner, stating that the work has been completed in accordance with the Contract Documents, Addenda, Bulletins, Trade Contractor's Punch List items and Design Professional's Construction Observation Report(s). Final Payment will not be approved until the notarized letter has been provided. Refer to the following sample letter.

SAMPLE LETTER

ENGINEER/ARCHITECT \_\_\_\_\_

TRADE CONTRACTOR \_\_\_\_\_

PROJECT \_\_\_\_\_ NO. \_\_\_\_\_

I hereby certify that all work under the HVAC, Plumbing, Fire Protection and Electrical Contract Documents, as applicable, including all addenda, bulletins, Punch List items and Construction Observation Reports, has been completed and the quality and workmanship of the work has been performed in accordance with Contract Documents.

State of: \_\_\_\_\_

County of: \_\_\_\_\_

Trade Contractor: \_\_\_\_\_

Subscribed and Sworn to before  
me this \_\_\_\_\_ day of  
20 \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Notary Public:  
\_\_\_\_\_

By: \_\_\_\_\_

My Commission Expires:  
\_\_\_\_\_

Date: \_\_\_\_\_

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## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURER'S AND SUB-CONTRACTORS LIST, KEYMEN RESUMES**

- A. Before ordering any material or equipment unit, and not later than ten (10) working days after signing of contracts, submit a list of Manufacturers, Sub-Contractors and Suppliers showing make, type, manufacturer's name and trade designation of all materials, and equipment, proposed for use under this contract. Prepare list by reference to specifications. Identify all long lead submittals which will require an expedited submittal review.
- B. Refer to the Article "Proposal Preparation," in this section. Specifically designate the labor force required of the Electrical Trade Contractor. As part of the mobilization phase of the work, submit resumes for each Keyman including the Project Manager and Project Foreman.
- C. These lists, when approved, will be supplementary to specifications, and no variations therefrom will be permitted except with the approval of the Design Professional.
- D. Prepare the list using the "PROPOSED MANUFACTURERS AND SUB-CONTRACTORS LIST" located at the end of this section.
- E. Submittals will not be processed until the requirements of this Article are satisfactorily completed.

### **2.2 SUBMITTALS**

- A. Provide digital submissions (.pdf format) for all material and equipment as noted in Proposed Manufacturer's and Sub-Contractors List, except where indicated otherwise herein.
  - 1. Prior to submission of product data, shop drawings, and samples, notify the Design Professional of any site conditions differing from those indicated or specified.
  - 2. Prior to submission of product data, shop drawings and samples to the design professional, the HVAC Trade Contractor, the Plumbing Trade Contractor and the Fire Protection Trade Contractor shall submit all submittals which require electrical power to the Project Electrical Trade Contractor for the HVAC Trade Contractor's, the Plumbing Trade Contractor's, the Fire Protection Trade Contractor's and the Electrical Trade Contractor's coordination and review. The Electrical Trade Contractor shall provide approval of electrical power requirements for the HVAC, Plumbing and Fire Protection Trade Contractors' proposed equipment.
  - 3. All submittals of equipment requiring electrical power must be accompanied by the "HVAC AND ELECTRICAL CONTRACTORS' COORDINATION OF HVAC EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET", the "PLUMBING AND ELECTRICAL CONTRACTORS' COORDINATION OF PLUMBING EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET" and the "FIRE PROTECTION AND ELECTRICAL CONTRACTORS' COORDINATION OF FIRE PROTECTION EQUIPMENT ELECTRICAL REQUIREMENTS TRANSMITTAL COVER SHEET", as applicable, all located at the end of this section. Submittals without this Cover Sheet or an incomplete Cover Sheet will be rejected without review.

4. All submittals must be accompanied by the "ELECTRICAL CONTRACTOR'S TRANSMITTAL COVER SHEET" located at the end of this section. Submittals without this cover sheet or with an incomplete cover sheet, will be rejected without review.
  5. All submittals must be accompanied by the "ELECTRICAL SUBMITTAL LOG", located at the end of this section. Submit log after final acceptance of the proposed Manufacturer's and Sub-Contractor's list. Revise and update the log with each submittal. Submittals without these logs or without an updated log will be rejected without review.
  6. Specifically annotate and sign all exceptions, deletions and additions that vary from the Project Contract Documents. Failing to provide signed annotations for all deletions and additions, recognize and accept that Contract Documents will govern, and will be used to resolve disputes.
- B. Prepare submittals by careful reference to: drawings and specifications; preparatory layout of all work; coordination with all proposed equipment; coordination with related submittals and the work of all other Trade Contractors; space requirements; and Utilities defined in this Section. A review of such submittals by the Design Professional, which include drawings, schedules, and catalog cuts provided by the Trade Contractors, their Sub-Contractors, manufacturers, and vendors, shall not relieve the Trade Contractors from the responsibility for correcting all errors of any sort in the submittals, either identified or undetected by such review.
- C. Regularly provide and update submittal log sheets listing submittal number, product, applicable specification section, dates of submittal and receipt and status. Identify each submittal by Job Name, log number and reference to applicable Specification Article number.
- D. All equipment submittals must include, but not be limited to, the following:
1. Manufacturers' catalog designation, photographs and specifications.
  2. Full electrical data, including specifically, electrical characteristics.
  3. Full General Construction data, including operating weights, dimensional data including service access space. Data shall be given to the General Construction Trade Contractor, where applicable, for use in setting steel, supports, and attachments.
  4. Full wiring diagrams, including clearly identified power connections and control connections. Data and diagrams shall be given to the Automatic Temperature Control (ATC) Trade Sub-Contractor for their use and inclusion into their submittals.
  5. Listing of specific electrical performance, calculations and data.
  6. Dimensions, capacities, ratings, material and finish.
  7. Complete the submittal by listing all available options, accessories, configurations and materials, and legibly strike out with single thin line all proposed deletions. Clearly signify whether each and every manufacturer's option, accessory, configuration and material choice is included and which is excluded by the submission.
  8. Annotation of equipment, devices, systems as indicated by the Contract Documents (PNL-1, etc.).
  9. Certification of testing by agencies such as ETL, ARI, UL, etc.
  10. Such other detailed information as required for proper evaluation.
- E. Review Time:

1. Allow two (2) weeks after Design Professional's receipt for the Design Professional's processing of each submittal, exclusive of Owner's, or other's review in the processing chain. Allow a longer time period where processing must be delayed for coordination with subsequent submittals.
- F. Submittals for electric motor starters must include a tabulation listing the following:
1. The equipment the starter is intended to control.
  2. Horsepower and starter size.
  3. Voltage.
  4. Phase.
  5. Full load amperes.
  6. The manufacturer's number or type.
  7. Heater numbers and amperage.
  8. Quantity of auxiliary contacts required by ATC and fire alarm systems.
  9. Pushbutton arrangement.
  10. Pilot light arrangement if applicable.
- G. Submittals for automatic temperature controls must be coordinated with: 1) all electrical equipment manufacturers' and vendors' submittals including review of electrical submittals by ATC Sub-Contractor for conformance with sequences of operation for each piece of equipment; 2) all electrical requirements of ATC System with Electrical Trade Contractor; and 3) all fire and safety requirements of the Fire Alarm System. ATC submittals shall include copies of all wiring diagrams for all electrical equipment with points of connections clearly identified. ATC submittals shall not be developed and submitted until Electrical Trade Contractor provides all equipment submittals for review.
- H. The Design Professional's recommendation of acceptance of the equipment proposed by the Electrical Trade Contractor is conditional upon the Electrical Trade Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Electrical Trade Contractor acknowledges compliance with all of the following:
1. Field layout is completed and planning of proposed equipment has coordinated with all related submittals, related trades and space requirements.
  2. The Electrical Trade Contractor has reviewed and approved all submittals prior to submission. Provide all submittals with a signed approval stamp, signifying the following: 1) all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been verified; 2) the Design Professional has been notified of all site conditions which affect the work, and which require design resolution, as opposed to resolution by trade decisions; 3) all items are approved by the Electrical Trade Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements; 4) submission is clearly marked to indicate which manufacturer's options are provided and which are not provided for the proposed equipment; and 5) manufacturers and/or equipment suppliers have been given a set of the contract documents for their review and use as the basis of the submittals.
  3. Any and all exceptions requested by the Electrical Trade Contractor are provided in writing with the submittals. All exceptions, deletions and additions that vary from the

Contract Documents have been specifically annotated and initialed. Failing to provide initialed annotations for all deletions and additions, the Electrical Trade Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.

4. Submittals without the Electrical Trade Contractor's signed stamp of approval will be returned without review. Initialed approval stamps are not acceptable.
  5. The Design Professional's acceptance of the proposed equipment constitutes the Engineer's formal approval that the engineering performance and operational utility requirements, of the proposed equipment, match the Design Professional's specified and designed performance requirements. By entering into these Contracts, the Trade Contractors agree that the purpose of submittals is to demonstrate to the Design Professional that the Trade Contractors understand the design concept and that they demonstrate their understanding by indicating which materials and equipment they intend to furnish, install and use.
- I. Secure submittals smaller than 8-1/2 x 11 to paper of this size.
  - J. Material and equipment fabricated, furnished and/or installed or used without the Design Professional's review are subject to rejection by the Design Professional.
  - K. Corrections or comments made on submittals during review by the Design Professional do not relieve the Electrical Trade Contractor from compliance with the requirements of the Contract Documents. Such review will be only for general conformance with the design concept, and the information given in the Contract Documents and does not include review of quantities, dimensions, sizing, pressure drops, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Electrical Trade Contractor. Review of a specific item does not indicate acceptance of an assembly of which the item is a component. The Design Professional is not responsible for any deviations from the Contract Documents that are not clearly noted by the Electrical Trade Contractor. The Design Professional will not review partial submissions or those for which submissions for correlated items have not been received. The Electrical Trade Contractor is responsible for: confirming and correlating all quantities, clearance, and dimensions; selecting fabrication processes and techniques of construction; coordinating work with all other Trades, and performing his work in a safe and satisfactory manner.
  - L. All submittals must be able to be reproduced. The Electrical Trade Contractor is responsible for all reproduction and distribution to the General Construction Trade Contractor and all other Trade Contractors as applicable.
  - M. If requested for the Electrical Trade Contractor's use in the preparation of submittals, an electronic copy (AutoCad .dwg format) of any of the Electrical Contract Drawings may be provided by the Design Professional, after receipt of a signed indemnification agreement, at a cost of \$250.00, paid in advance, by the Electrical Trade Contractor.
  - N. For additional requirements regarding submittals, refer to Article "Additional Trade Contractor Paid fees and Expenses" in Part 3 of this section.



## **2.3 MATERIALS AND EQUIPMENT**

- A. All materials and equipment must be new and conform to the grade, quality and standards specified herein.
- B. All equipment offered under these specifications is limited to products regularly produced and recommended for service ratings in accordance with engineering data or other comprehensive literature made available to the public and in effect at the time of opening of bids. Testing agency seals, decals and/or nameplate shall be attached to and visible on all equipment.
- C. Items such as valves, motors, starting equipment, vibration isolating devices, and all other equipment and material, where applicable and practicable, must each be of one manufacturer.
- D. Install equipment in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. Obtain these instructions, which will be considered part of these specifications. Type, capacity and application of equipment must be suitable and operate satisfactorily for the purpose intended in the electrical systems.

## **2.4 EQUIPMENT VARIATIONS AND SUBSTITUTIONS**

- A. Equipment Substitution Definition as follows:
  - 1. A product that is neither the Basis of Design, nor one of the named Alternative Manufacturing Sources.
  - 2. Unless noted otherwise in the Contract Documents, substitutions may be considered after the award of Contracts. Subsequent requests will be considered only when, through no fault of the Electrical Trade Contractor, none of the specified products are available.
- B. Equipment Variation Definition as follows:
  - 1. A product that is not the Basis of Design, but is named as one of the specified Alternative Manufacturing Sources.
- C. The manufacturers listed in Part 2 of all technical specifications are considered Alternative Manufacturing Sources as described in Paragraphs A and B above.
- D. "Subject to compliance", as used in these specifications, means compliance with all the requirements of the Contract Documents.
- E. The materials and products mentioned in these Contract Documents are specified to establish a standard of: material of manufacture; independent testing agency certifications; quality; function; design; and performance. The phrases "Basis of Design," "standard of design," and "equivalent acceptable," are used to indicate that other similar, comparable products may be used provided such substitutes or variations are accepted by the Design Professional as meeting all the salient characteristics and standards necessary, such as: material of manufacture; independent testing agency certifications; quality; function; design; and

performance, to meet the Owner's needs and meet the objectives of the Design Professional's Project Design.

- F. Where Alternative Manufacturing Sources are listed for an item:
  - 1. Selection must be either the Basis of Design or one of those listed Alternative Manufacturing Sources.
  - 2. There is no guarantee implied that each and every manufacturer listed can meet or exceed the salient characteristics, such as: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as Basis of Design.
- G. Each Trade Contractor is responsible to contact each proposed equipment manufacturer's representative and confirm, prior to preparing submittals, the proposed manufacturer's product meets or exceeds the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design. Final acceptance will be determined by the Design Professional, whose decision is final.
- H. Submittals offered as an Equipment Variation from the Basis of Design shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacture; quality; function; design; and performance of the product specified as the Basis of Design. If directed by the Design Professional for Products offered as an Equipment Variation, the Offerer shall provide a Letter of Confirmation from a Registered, Professional Engineer attesting that the Proposed Equipment Variation conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- I. Specific products specified without use of the term: equal; equivalent; comparable product; substitution; or similar term; constitute a proprietary specification, and must be provided as specified, unless a written request is submitted to the Engineer for approval up to ten (10) days after the date of project award. Such requests must include a complete description of the proposed product, along with sufficient documentation and other information necessary for a complete evaluation of the proposed product. Such Trade Contractor Requests shall include a letter, on the product manufacturer's letterhead, certifying that the proposed product is a Comparable Product and conforms to all the salient characteristics, including: material of manufacture; independent testing agency certifications; quality; function, design; and performance of the specified product. If approved, the proposed product will be listed in an addendum to notify all bidders that such acceptance has been granted by the Design Professional. If not approved, provide the specified product.
- J. Provide Calculations, signed and sealed by a Professional Engineer registered in the State in which the work is taking place, engaged by the Electrical Trade Contractor, confirming that the equipment proposed as either a Substitution, or Variation, is a Comparable Product to the product specified as the Basis of Design and conforms to all the salient characteristics, including: material of manufacturer; independent testing agency certifications; quality;

function; design; and performance of the product specified as the Basis of Design. Provide such calculations for major pieces of equipment (emergency generators, switchgear, transformers, etc.). The Design Professional, whose decision will be final, will determine which products will require calculations during the submittal review process.

- K. The Contract Documents have been founded upon Engineering Design selection of materials, products, and pieces of equipment listed at the Basis of Design. In the event that the incorporation of an approved Substitution, Variation, or assembly, into the work, requires revisions or additions to the contractual requirements of either the Trade Contractor proposing the substitution or variation, or any other Trade Contractor, the Trade Contractor proposing the substitution or variation, shall bear the cost of: such revisions or additions to the work of the Trade Contractor proposing such Substitution and/or Variation; any expenses of all affected trades; and all engineering or architectural services required at no change in the contract sum.
- L. The equipment specifications indicated on the drawings, or in Part 2 of each of the technical specifications, may or may not indicate or include all of the required salient characteristics, components and accessories included with the specified product. Include cost for all such characteristics, components and accessories required to meet or exceed the: material of manufacture; independent testing agency certifications; quality; function; design; and performance of the product specified as the Basis of Design.
- M. For requirements regarding equipment variations after bid award, refer to Article "Additional Trade Contractor Paid Fees and Expenses" in Part 3 of this section.
- N. Each Trade Contractor negotiating for pricing advantages affecting the Trade Contractor's Bid shall comply with the directives included herein, bear full responsibility for the accuracy and completeness of the submissions required of the Vendor selected by the Trade Contractor. The Proposing Trade Contractor shall bear full responsibility for all extra costs of the Design Professional shown to have resulted from inaccurate, and/or incomplete compliance with the directives included in this Specification Article.
- O. All decisions provided by the Design Professional, described herein, shall be final.

## **2.5 VIBRATION ELIMINATION**

- A. Provide vibration isolation support provisions for all moving or rotating equipment, machinery and transformers when such provisions are not furnished and/or integrally mounted by the equipment manufacturers. Install in accordance with vibration isolation manufacturer's recommendations unless specified otherwise herein.
- B. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Amber/Booth Company;
  - 2. Korfund Company, Inc.;
  - 3. Mason Industries;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.

- C. Provide all rotating or moving machinery or equipment mounted on, or suspended from, building structure with approved resilient suspension isolation mountings.
- D. Provide vibration isolating connections between all pumps and connecting piping. Length, size, and stiffness as recommended by vibration isolator manufacturer.
- E. Use flexible metallic conduit for all electrical connections to moving or vibrating equipment, such as motors, generators, transformers, and the like.
- F. Rigid pipes, conduit or other extended machine assemblies connected to vibration isolated equipment are not permitted to be tied in directly with the building construction. Connect such elements to the equipment through flexible fittings, and support using isolating equipment as required.
- G. All systems must operate free from objectionable vibration and noise. Take all necessary steps required to achieve this result without additional cost to the Project.

**2.6 NOISE CONTROL**

- A. Noise levels in all 8 octave bands due to equipment and systems shall not exceed NC 35 within the occupied room, except as follows:

<u>TYPE OF ROOM</u>	<u>NC LEVEL</u>
Audio Suites, Audio Speech Pathology, Phono/Cardiology	25
Operating Rooms	40
Offices, large open	40
Lobbies, Waiting Areas	40
Corridors	40
Bath Rooms and Toilet Rooms	40
Laboratories	45
SPD, Dining Rooms, Food Service/Serving, Therapeutic Pools	45
Kitchens, Locker Rooms, Warehouses, Shop, Laundries, Gymnasiums, Recreation Rooms	50
X-Ray & General Work Rooms	40

- B. For equipment which has no sound power ratings scheduled on the plans, select equipment such that the fore-going noise criteria, local ordinance noise levels, and OSHA requirements are not exceeded. Selection procedure shall be in accordance with ASHRAE 2015 HVAC Applications Handbook, Chapter 48, NOISE AND VIBRATION CONTROL.
- C. An allowance, not to exceed 5db, may be added to the measured value to compensate for the variation of the room attenuating effect between room test condition prior to occupancy and design condition after occupancy which may include the addition of sound absorbing material, such as, furniture. This allowance may not be taken after occupancy. The room attenuating effect is defined as the difference between sound power level emitted to room and sound pressure level in room.

- D. In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.
- E. If sound levels are exceeded, provide sound reducing devices, including, but not limited to: sound attenuators; acoustic enclosures; additional equipment insulation or vibration isolators to conform to these specifications. Provide required material and labor at no additional cost to the project.

## **2.7 INSERTS, HANGER SUPPORTS, CLAMPS, FASTENINGS**

- A. All materials, designs and types of inserts, hanger supports and clamps must meet the requirements of the latest edition of the Manufacturers Standardization Society Document MSS-SP-58, Underwriters Laboratories, Inc., National Electrical Code and Factory Mutual Engineering Division Standards where applicable. Insert, hanger support and clamp types referenced herein are shown in MSS-SP-58.
- B. Provide all necessary inserts, hanger supports, fastenings, clamps and attachments necessary for support of the electrical work. Select the types of all inserts, hanger supports, fastenings, clamps and attachments to suit both new and existing building construction conditions specifically for the purposes intended.
- C. In new overhead cast-in-place concrete construction, provide type 19 steel concrete inserts and fasten to form work before concrete is cast. For cast concrete floor or roof sections too thin to permit the use of inserts, extend the hanger rod through the slab and terminate with a nut and large washer, recessed into the top face of the slab as approved by the Design Professional.
- D. Clamps and attachments to steel beams and bar joists must be made using types 20, 21, 23, 25, 27, 28, 29 or 30 as applicable to suit conditions of construction. Clamps and attachments must be selected on the basis of the required load to be supported. Provide all necessary steel angle iron or channel between bar joists, or steel beams where direct attachment cannot be made. Holes are not permitted to be drilled or burned in structural building steel for hanger rod supports. Welding of hangers or supports to structural steel is prohibited unless approved beforehand by a Structural Engineer.
- E. Metallic masonry anchors may be provided for all pre-cast concrete, masonry and cast concrete construction as an alternate to item (C) above. Locate in pre-cast and cast-in-place concrete as directed by the Structural Engineer. Select and install as recommended by the anchor manufacturer for the various applications, stresses and services involved. Accomplish installation of masonry anchors by pre-drilling concrete or masonry to diameters and depths required to properly accommodate anchor bolts.
- F. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Dynabolt;
  - 2. Ram-In;
  - 3. Tru-Bolt manufactured by Ramset;
  - 4. Redhead;

5. Hilti;
  6. Wej-It;
  7. Or approved equal in accordance with the project substitution provisions of the contract.
- G. Toggle bolts may be used in dry wall and lath and block plaster walls. The use of toggle bolts is restricted to the weight limitations imposed by the toggle bolt manufacturer for the size used.
- H. Except where noted otherwise herein, attachment to wood or material of similar fibrous nature must be made with lag screws and/or wood screws of required size.
- I. Screws with wooden or plastic plugs, or lead anchors are not acceptable.

## **2.8 ACCESS DOORS AND PANELS**

- A. For projects which include the work of a General Construction Trade Contractor, furnish and locate for installation under General Construction, all access doors and panels for concealed portions of electrical work requiring accessibility for operation and maintenance. If project does not include a General Construction Trade Contractor, provide access doors as required.
- B. Access doors and panels may not be installed without specific approval of the Design Professional as to location. The proposed location of access doors and panels must be reviewed with the Design Professional and the General Construction Trade Foreman, where applicable, and the locations indicated on the coordination drawings prior to installation of equipment, access doors or panels. Controversies must be resolved at no cost to the Project.
- C. Minimum size of 24" x 18" unless shown, specified or approved otherwise.
- D. Sixteen (16) gauge minimum construction with concealed spring hinges, screw fasteners and painted finish. Color by Architect.
- E. Subject to compliance with the requirements, provide products by one of the following:
1. Milcor;
  2. Karp;
  3. Mifab;
  4. Or approved equal in accordance with the project substitution provisions of the contract.
- F. For access doors in drywall, provide drywall bead flange.
- G. For access doors in hard plaster or ceramic tile, provide expanded metal casing bead.
- H. For access doors in unplastered masonry and concrete, provide one piece frame for flush mounting.
- I. For access doors in acoustic tile ceilings, provide recessed door panel with room to receive acoustic tile.

- J. Underwriters "B" label access doors where required for access to shafts, corridors, and where located in fire walls and partitions.

## **2.9 EQUIPMENT ANCHOR BOLTS**

- A. Provide and set in place at the time concrete foundations, bases or curbs are poured or formed, all necessary anchor bolts as required for the various equipment specified herein, with hook type anchor bolts of proper size and length to suit the apparatus as recommended by the equipment manufacturer. Set bolts in pipe sleeves of approximately twice the bolt diameter and of length equal to the embedded length of the bolt, with sleeves terminating flush with finished surfaces of foundations, bases or curbs.
- B. When the equipment is set in its proper position and aligned with the anchor bolts, the space between the anchor bolts and the inside wall of the sleeves must be completely filled with non-shrink cementitious grout.
- C. Subject to compliance with the requirements, provide products by one of the following:
  - 1. Crystex as manufactured by L & M Construction Chemicals, Inc.;
  - 2. Master Builders;
  - 3. BASF;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- D. When a General Construction Trade Contractor provides concrete foundations, bases or curbs, the Electrical Trade Contractor is responsible for all anchor bolts required by the equipment he provides, under the Contract Documents. Assign a supervisory representative to be present at the time foundations, bases or curbs are poured or formed. For projects wherein there is no General Construction Trade Contractor, the Electrical Trade Contractor is responsible for pouring, locating, and setting equipment foundations, bases and curbs and the location of anchor bolts for the equipment provided or installed by him on this Project.
- E. All anchor bolts must be of sufficient strength to withstand any loading imposed by the attached materials or equipment.

## **2.10 PIPING AND CONDUIT SLEEVES**

- A. Provide all sleeves required for electrical work and be fully responsible for the final and permanent locations thereof.
- B. Provide sleeves in the following locations:
  - 1. All pipes and conduits passing through all cast-in-place concrete construction and masonry walls.
  - 2. All pipes and conduits passing through cast-in-place waterproof concrete construction and waterproof masonry walls.

- C. Extend through construction and finish flush with each surface except where noted otherwise. Provide for a minimum ½" clearance around conduit, pipe or its covering in the instance of pipe covered with insulation.
- D. All sleeves in waterproof walls and floors must be fitted and sealed with positive hydrostatic mechanical seals. Sleeves must be sized accordingly. Mechanical seals must be placed around piping and/or conduit and inserted into void between inner wall of sleeve and piping and/or conduit. Tighten mechanical seals as required for watertight seal.
- E. Subject to compliance with the requirements, provide products by one of the following:
  - 1. "Link Seal" as manufactured by Thunderline Corporation;
  - 2. Advance Products and Systems, Inc.;
  - 3. Proco Products, Inc.;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- F. All sleeves must be Schedule 40 steel pipe finished with smooth edges. Sleeves in waterproof walls and floors must be fabricated with minimum 1/4" thick rectangular steel plate placed around mid-point of sleeve, continuously welded to sleeve and then place the entire/plate assembly into proper position prior to erection of walls and floors. Otherwise, provide sleeves with a minimum of three (3) lugs for anchoring.
- G. Pack voids between sleeves, piping or conduit, where located in fire or smoke rated assemblies, in accordance with UL Fire Resistance Directory.
- H. Set all sleeves prior to or during erection of walls and floors. In the event that sleeves are omitted or incorrectly located in new walls or slabs, submit a location plan and method of cutting and installing sleeves to the Design Professional for review prior to carrying out the work.
- I. If sleeves are omitted or located incorrectly, the particular Trade Contractor who is at fault, at no additional cost to the project, must engage the trade which originally installed the work, to cut and patch to the satisfaction of the Design Professional.
- J. Provide mechanical seals and insert into voids between piping and conduits that pass through floors, and which will be exposed in finished areas that have floor drains, including spaces classified as "Janitors Closets," "Toilet Rooms," and the like.
- K. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine, such as a masonry saw or core drill, to insure a neat hole.

## **2.11 SMOKE/FIRESTOPPING (MATERIALS)**

- A. Firestopping materials and systems must consist of commercially manufactured products complying with the following minimum requirements and be asbestos and PCB free:



1. Flame Spread Index: Twenty-five or less when tested in accordance with ASTM E 84.
  2. Smoke Density Index: Fifty or less when tested in accordance with ASTM E 84.
  3. Nontoxicity: Nontoxic to human beings at all stages of application and during fire conditions.
  4. Systems shall comply with Underwriter's Laboratory Listing Requirements.
  5. Fire Resistance:
    - a. Materials and systems used to seal penetrations in time rated assemblies must be capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E 119 time temperature fire conditions for 3 hours.
    - b. Materials must not require a rise in temperature to install or activate seal.
    - c. Materials must not contain solvents or require hazardous waste disposal.
    - d. Firestop material must not dissolve in water after curing.
- B. Subject to compliance with the requirements, provide products by one of the following:
1. Rectorshield, Inc.;
  2. Hilti;
  3. 3M;
  4. Or approved equal in accordance with the project substitution provisions of the contract.
- C. Refer to general construction contract documents of these specifications.
- D. Smoke stopping materials must be approved by the authority having jurisdiction.

## **2.12 FIRE/SMOKE DAMPERS, SMOKE DETECTORS/SMOKE DETECTOR CONTROL**

- A. All fire/smoke dampers for the project will be provided by the HVAC Trade Contractor.
- B. Refer to the general construction contract documents, where applicable, for locations and classification ratings for all smoke and fire rated walls, floors and assemblies, new and existing.
- C. Duct mounted smoke detectors will be used to activate smoke dampers unless area detectors are used to activate smoke damper. Tie detectors into the building's fire alarm system. HVAC Trade Contractor will tie detectors into the Building Automation System (BAS) where applicable.
- D. Electrical Trade Contractor shall provide area smoke detectors for operation of smoke dampers as applicable and specified. Electrical Trade Contractor shall connect, then test and check-out smoke detectors connected to the building's fire alarm system as specified. Electrical Trade Contractor to check-out smoke detectors tied into the Building Automation System.
- E. All new duct mounted smoke detectors shall be furnished by the Electrical Trade Contractor and installed by the HVAC Trade Contractor, and shall be installed generally as located on the HVAC drawings.

- F. Connections for automatic shutdown of air handling units shall be provided by the HVAC Trade Contractor, in compliance with the ATC Section of these specifications. Connections for fire alarm system shall be provided by the Electrical Trade Contractor.
- G. HVAC Trade Contractor shall clearly indicate location of all new smoke detectors required in ductwork on sheet metal shop drawing submissions.
- H. Smoke evacuation system control and actuation shall be provided by the HVAC Trade Contractor, with detection and signal for the fire alarm system provided by the Electrical Trade Contractor.
- I. Area actuation signals and connections for smoke dampers shall be provided by the Electrical Trade Contractor. Locate signal where visible to Building Personnel.

### **PART 3 - EXECUTION**

#### **3.1 METHOD OF PROCEDURE**

- A. The drawings accompanying these specifications are diagrammatic and intended to cover the approximate and relative locations of the building systems.
- B. Installation, connection and interconnection of all components of these systems must be complete and made in accordance with the manufacturers' instructions and best trade practices.
- C. Erect all parts of equipment furnished at such time and in such manner as not to delay or interfere with other Trade Contractors and their work.
- D. Plug all piping, conduit and ductwork as required during construction to prevent entering of dirt.
- E. Before material is ordered or fabricated, or any work is performed, verify all calculations, sizing, measurements, including lines, grades, pipes, and conduit elevations at the building, as applicable, and be responsible for the correctness thereof. No extra compensation will be allowed on account of differences between actual dimensions, routing and measurements and those indicated in the Contract Documents. Any discrepancies discovered must be submitted to the Engineer for consideration before proceeding with the work.
- F. Lay out work and be responsible for the establishment of heights, grades, and the like, for all interior and exterior equipment and systems as applicable, including piping, drains, fixtures, conduit, and the like, included in Contract Documents, in strict accordance with the intent expressed thereby; and all the physical conditions to be met at the building and finished grade, and be responsible for accuracy thereof. The establishment of the location of all work must be performed in consideration of the finished work. In case of conflict, equipment and/or materials must be relocated without cost to the Project, as directed by the Design Professional, regardless of which equipment was installed first. Refer to Article, "Coordination Drawings", in Part 1 of this section.

- G. Cooperate with other Trade Contractors for the proper securing and anchoring of all work included within these specifications. Use extraordinary care in the erection and installation of all equipment and materials to avoid marring surfaces of the work of other Trade Contractors, as each Trade Contractor will be held financially responsible for all such injury caused by the lack of precaution and due to negligence on the part of the Trade Contractor's work force.
- H. Do not run pipe or conduit in any concrete slab three inches (3") or less in thickness. Do not place any pipe or conduit in any slab where the outside diameter of the pipe or conduit is more than one-quarter the thickness of the slab. The sweep of pipe or conduit elbows emerging through concrete slabs must not create any hazard or obstructions.
- I. All piping, conduit and other materials and equipment shown to be mounted below ceilings are to be kept as close to ceiling areas as possible unless otherwise noted.
- J. Install and arrange all equipment, such as junction boxes, and the like, which will be concealed in construction, to be fully accessible for adjustment, service and maintenance. Furnish access doors where required for installation under the General Construction Contract, where applicable. Otherwise, furnish and install all required access doors.

### **3.2 PROTECTION OF WORK**

- A. Provide all piping, equipment, materials and accessories having polished or plated surfaces, machined finishes or unpainted surfaces with a thick coat of a neutral protection grease and carefully cover with thick cloth or heavy building paper held securely in place to protect the finish against damage during the entire period of construction. Protect equipment by the use of canvas tarps, vinyl sheeting or similar materials held securely in place.
- B. Seal all openings in pipes, fittings, conduit and all other materials to exclude dirt, sand, and other foreign materials.
- C. Exercise every precaution to exclude dust, dirt and all other foreign materials from switchgear rooms, transformers, and all mechanical equipment rooms during construction. Rooms and equipment contained therein must be swept and vacuum cleaned at regular intervals. All relays, meters and electrical equipment containing electrical components must be protected with heavy paper held in place with approved mastic tape to exclude fine dust and particles. Install and maintain sufficient electric heaters in equipment rooms and transformer compartments to keep equipment dry during construction.

### **3.3 CUTTING AND PATCHING**

- A. New Construction:
  - 1. Perform cutting and patching in accordance with Division 01.
  - 2. Provide and set all sleeves, inserts and other items required for the installation of the electrical work, and take responsibility for their final and permanent locations.
- B. For existing construction:

1. All Trade Contractors are responsible for their own cutting and patching.

### **3.4 CONCRETE AND MASONRY**

- A. Provide all cast-in-place concrete, pre-cast concrete and masonry work (brick and block) required for completion of the electrical work, including interior and exterior concrete slabs.
- B. Design Professional will review and approve materials used.
- C. Unless shown or specified otherwise, all equipment foundations and housekeeping pads must be six inches (6") minimum height from floor, of sufficient mass, and secured to the floor.
- D. Refer to general construction contract documents for concrete specifications.
- E. Unless noted otherwise, concrete bases must be 4" larger than the largest dimension of the base of the supported equipment in both directions. Use 3000 psi, 28 day compressive strength concrete and reinforcement.

### **3.5 SUPPORTS**

- A. Except where noted otherwise in the specifications and shown on drawings, provide all materials, including, but not limited to, equipment supports, supplies and labor necessary as required to adequately support, brace and strengthen new and/or existing equipment and materials installed under/or affected by the electrical work.
- B. The design, materials, fabrication and erection of structural steel supports must conform to "Specification for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction, "Code of Standard Practice for Steel Buildings and Bridges". Welding, where required, must conform to "Code of Arc and Gas Welding in Building Construction" of the American Welding Society.

### **3.6 ROOFING WORK**

- A. Existing roofing and flashing is under Manufacturer's and Installer's Warranties. Electrical Trade Contractor shall have all roofing and flashing work performed by warranted roofing installer. Contact Owner or original installer for further information. New penetrations through the roof shall be in full warranty condition. If required by the roof warranty, engage the original roofing installer to perform all roofing and flashing work. Refer to the general construction contract documents of these specifications.

### **3.7 PAINTING AND FINISHING**

- A. All painting, generally, will be provided by the General Construction Trade Contractor, where applicable, except where specifically noted otherwise in the Electrical Specifications. Otherwise, all Trade Contractors are responsible for their own painting and finishing.

- B. Equipment and material furnished with factory enamel finish will not be painted unless finish has been damaged, in which case the equipment or material must be refinished by the Trade Contractor who furnished it, to the satisfaction of the Design Professional.

### **3.8 LUBRICATION**

- A. Provide proper and necessary lubrication of any items of operating, rotating or moving equipment which is furnished, installed or which must operate as part of the electrical system.
- B. When an item of operating equipment is furnished and installed by a Trade Contractor, it will be that Trade Contractor's responsibility to accomplish the lubrication.
- C. When an item of operating equipment is furnished by one Trade Contractor and installed by another, it is the responsibility of the Trade Contractor furnishing the equipment to apply the lubricants.
- D. All rotating or moving equipment must be lubricated prior to energizing and operating the equipment. Should the Trade Contractor responsible for the lubrication fail to apply lubricants prior to initial start-up and the equipment is damaged as a result of that Trade Contractor's negligence, that Trade Contractor is required to provide all corrective action necessary including replacement, if required, for the proper operation of equipment.
- E. Lubrication must be accomplished in the manner prescribed or recommended by the manufacturer of the specific item. For motor driven equipment this precaution of lubrication will apply individually to the driver and the driven component.
- F. The lubricants must be of the type, grade, specification and manufacture as prescribed or recommended by the manufacturer of the specific equipment item.
- G. Extend lubrication fittings where required to allow maintenance personnel to lubricate the equipment easily and efficiently.
- H. The Trade Contractor who supplies any item of rotating equipment will have the responsibility of securing written instructions on the lubricating procedure and must furnish not less than one year's supply of all necessary lubricants properly identified so they can be replaced.
- I. Any moving or rotating equipment furnished by the Owner that is to be installed, reused and/or serviced must also be lubricated. Except where noted otherwise in the Contract Documents, the Trade Contractor installing, reusing and/or servicing all such equipment is responsible for the proper lubrication thereof, including obtaining proper lubricating instructions from the various manufacturers involved, furnishing and applying the necessary lubricants and leaving the Owner with a one (1) year supply of lubricant.

### **3.9 ELECTRICAL TRADE COORDINATION**

- A. Equipment by other Trade Contractors shall be furnished with electrical current characteristics as shown on electrical drawings and specifications.

- B. The nameplate voltage of all motors furnished with mechanical equipment must be within the range of the voltage shown for use with the motor as the upper limit, and 5% less than this voltage as the lower limit.
- C. Other Trade Contractors must furnish all motors, motor starters, specialty motor controllers, float and pressure switches, temperature control, other special automatic controls as indicated in the Contract Documents for all equipment furnished and/or installed under their contract except where noted otherwise.
- D. All electrical equipment furnished by other Trade Contractors must be as recommended by the equipment manufacturers, in accordance with the Electrical Specifications for similar items, and of such type as to work properly with automatic temperature control sequences where required.
- E. The Electrical Trade Contractor must provide all push-buttons, safety switches for motors, and wiring from starters to motors and install all starters furnished to him by other Trade Contractors unless otherwise indicated in the Contract Documents.
- F. Where controllers and/or starters are furnished as an integral part of any equipment, the Trade Contractor supplying the equipment must furnish complete wiring between controllers, starters and motors.
- G. The Electrical Trade Contractor must provide disconnect switches for all equipment furnished and/or installed by other Trade Contractors, except where such switches are an integral part of equipment.
- H. Other Trade Contractors must set all motors and furnish, set and pipe as necessary, float switches, temperature control and other special automatic temperature controls.
- I. Other Trade Contractors must provide all power and control wiring required by their respective section of the specification. The Electrical Trade Contractor must provide all other wiring required for the completion of the work of the other Trade Contractors.
- J. Other Trade Contractors must furnish the Electrical Trade Contractor with complete wiring diagrams as required.
- K. Any electrical work performed by the other Trade Contractors must be performed in accordance with the requirements of the ELECTRICAL Section of these specifications.
- L. For additional coordination items, refer to Article 2.2, "Submittals".

### **3.10 ELECTRICAL MOTORS AND STARTERS**

- A. All motors furnished by all Trade Contractors, unless specified to the contrary in Contract Documents, must conform to the following requirements:

1. Characteristics, dimensions, tolerances, temperature rise, insulation, rating, noise, vibration, and all other characteristics in accordance with the latest standards of IEEE or NEMA.
  2. Unless required by the driven unit, motors must have normal starting torque, NEMA Design B characteristics. Horsepower rating of motor must be equal to or greater than that required by driven equipment. Current density design of motor rating must be limited so that overload protection provided by standard motor starters will be adequate to prevent damaging overheating during stall, single phasing or slightly prolonged acceleration.
  3. Use NEMA Class A or B insulation with motor frames amply sized to provide a 1.15 service factor at an ambient of 40 deg. C maximum. Insulation systems must be designed for an average life of 60,000 hours.
  4. All motors must be high efficiency. Meet or exceed requirements in NEMA Standard MG1, Table 12-10.
  5. Running power factor must be higher than 0.85 for motors 5 HP to 30 HP and higher than 0.90 for motors 40 HP or larger.
  6. Each motor must be mounted on the same bedplate as the equipment driven and be complete with pulleys, slide rails or flexible couplings as required.
  7. Each Trade Contractor is responsible in each instance for the proper selection of motors of suitable characteristics with details submitted for approval to the Design Professional prior to installation.
- B. All starters furnished by all Trade Contractors must conform with the following requirements, unless specified to the contrary in the Contract Documents:
1. All starters for 3-phase equipment must be fully enclosed, across-the-line type equipped with solid state overload protection as herein specified for all three phases, low voltage protection, all necessary auxiliary contacts as required and indicating pilot lights. Starters which are controlled automatically must have two-wire control with "ON-OFF-AUTO" switches. Starters which are controlled manually must have 3-wire control with Start-Stop pushbuttons.
  2. All 3-phase starters remotely controlled must have 120 volt coils and control transformers with disconnecting means. Starters for single phase motors shall be manual toggle switches with thermal overload protection and pilot light. Omit pilot light for unit heaters.
  3. General Purpose NEMA-1 enclosure for indoor use under normal atmospheric conditions. Watertight enclosure NEMA-4 or NEMA-5 for outdoor use or where starters are subjected to the splashing or dripping of water. Explosion-proof enclosure NEMA-7, 9 or 12 for dusty or hazardous locations as required by Article 500 of the National Electrical Code.
  4. Individually equip all starters for three phase motors with solid state adjustable overload protection with automatic protection to prevent single phase operation with the following features:
    - a. Three phase, self-powered with current sensing, phase unbalance and phase loss protection, visible trip indication, trip test function, and power "LED."
    - b. Phase loss protection to include automatic restart with a selectable manual switch.

- C. All controllers, starters and other electrical components furnished as an integral part of any apparatus must be furnished complete with integral wiring as required.
- D. Subject to compliance with the requirements, provide products by one of the following:
  - 1. General Electric Co.;
  - 2. Westinghouse Co.;
  - 3. Square-D Co.;
  - 4. Allen-Bradley Co.;
  - 5. Or approved equal in accordance with the project substitution provisions of the contract.
- E. Submittals for motors and starters must be coordinated with Electrical Trade Contractor.

### **3.11 ELECTRICAL PROVISIONS FOR PACKAGED MECHANICAL EQUIPMENT**

- A. Unless otherwise noted in HVAC, Plumbing and Fire Protection Specifications, all packaged equipment furnished by HVAC, Plumbing and Fire Protection Trade Contractors must be complete with the following electrical provisions:
  - 1. General compliance with provisions of the preceding Article, ELECTRICAL MOTORS AND STARTERS.
  - 2. Starting electrical characteristics of all motors and/or starters must be approved by local utility company and Electrical Engineer.
- B. Approved, factory installed and wired starting, operating and control equipment, terminating in terminal strip for single point power wiring connections by Electrical Trade Contractor must conform with the ELECTRICAL Section of these specifications and must include approved branch fuses for branch power circuits.

### **3.12 PIPING AND CONDUIT UNDER FLOORS**

- A. Wherever piping, conduit or piping enclosures are run under a floor slab on grade, the work is to be installed after the General Construction Trade Contractor, where applicable, has brought the sub-grade to the proper level.
- B. Excavate and backfill as required for the installation of electrical work. The excavation of the sub-grade where required for the installation of the work must be performed, including that for piping, conduit and piping enclosures, by the Electrical Trade Contractor. When the installation is completed and satisfactorily tested, the remaining space shall be filled with crushed stone or other material similar to that to be used by the General Construction Trade Contractor, where applicable, for the sub-base. The backfill must be stabilized by hand or pneumatic tamping as directed by the Design Professional and must be returned to the original sub-grade level.



- C. No piping, conduit or piping enclosures is to be installed in the stone sub-base which is part of the General Construction Trade Contractor's work, where applicable, unless specific permission is granted by the Design Professional.
- D. Where piping is noted to be installed in enclosures, such as split terra cotta pipe, necessary protection of the insulation, arrangement and installation will be as hereinafter described in the detailed technical specifications.
- E. Where required by drawing notes, specifications, or applicable electrical codes, conduits installed under floors must be encased in concrete, conforming to the general construction contract documents specifications.

### **3.13 EQUIPMENT IDENTIFICATION**

- A. Manufacturer: Subject to compliance with the requirements, provide products by one of the following:
  - 1. Seton Nameplate Corporation;
  - 2. Marking Services, Inc.;
  - 3. Brady Worldwide;
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Identify all equipment as to nature, service and purpose by means of permanently attached plastic nameplates having ½" high letters, dull black outside and white core. Nameplates of approved size, beveled edges and engraved through black to white core. Nameplates shall indicate equipment identification names and numbers as approved by the Owner.

### **3.14 ABANDONMENT, REMOVAL AND RELOCATION**

- A. Perform all abandonment, removal and relocation work required for completion of electrical systems.
- B. Removals shown on drawings are a general indication only, and may not necessarily indicate the full extent of removals which may be required to complete this work.
- C. Where existing partitions, walls, ceilings and floors are to be removed, all piping, conduits, materials and equipment attached or fastened thereto or within, as applicable, must be carefully removed.
- D. Where work under this contract interferes with the existing construction, ductwork, piping, conduit or equipment, remove all such materials and route new work to clear the obstruction. Provide additional piping, conduits, and material of the same design and quality if the piping and/or conduit is to be continued in use.
- E. Disconnect and remove all accessible piping, conduit, ductwork, materials, fixtures and equipment not required in the new systems. Plug all outlets at the main or riser connection.

- F. Removed materials not desired by the Owner and not to be reset and not specified nor indicated to be reused, become the property of the Electrical Trade Contractor and must be promptly removed from site.
- G. All demolition work is subject to the direction and approval of the Design Professional and must be performed in such manner as not to interfere with the normal operation of the building.
- H. Relocate existing utilities and/or equipment that must remain to maintain operation of building or parts of building outside the work area.

I. Equipment Pad Removal:

- 1. Remove all concrete pads and equipment support structure material related to the Electrical Trade, not indicated or specified for reuse. Remove concrete pads to one (1) inch below adjacent concrete floor surface. Exterior slabs shall be broken and removed as waste materials.
- 2. Cut-off reinforcement and anchor bolts at or below level of pad removal.

- a. Resurface area level with adjacent concrete floor surface using a heavy duty aggregate concrete topping consisting of Portland cement Type I or Type III conforming to ASTM C150 with aggregate graded by weight to pass sieves as follows:

Fine (Thin Coat)		or	Course (Heavy Coat)	
3/8"	100%		1/2"	100%
No. 4	95-100%		3/8"	30-50%
No. 8	65-80%		No. 4	0-15%
No. 16	45-65%		No. 8	0-5%
No. 30	25-45%		No. 100	0-5%

- b. Topping mix must contain a high range water reducing admixture (super plasticizer) ASTM C494, Type F or Type G.
- c. Coat surface with epoxy bonding agent prior to application of concrete topping.
- d. Produce a heavy duty concrete topping with the following characteristics:

Compressive Strength	5000 psi at 28 days
Slump	8" maximum
Water to Cement Ratio	0.44.

**3.15 SMOKE AND FIRESTOPPING (METHODS)**

- A. Installation of materials must be performed by applicator/installers qualified, trained and approved by the manufacturer of the materials, and be installed in accordance with ASTM E 814.

- B. Install smoke and firestopping at locations required, shown, or specified in accordance with applicable codes, manufacturer's written instructions, and test report, applying to the specific trade equipment as applicable. Cutting and patching of construction and providing sleeves, where required, is shown on drawings or specified in other sections.
  - 1. Filling of Voids: Smoke and firestopping materials must completely fill void spaces regardless of geometric configuration, subject to tolerances established by the manufacturer. Smoke and firestopping for filling voids in floors in which the smallest dimension of the void is 4 in. or more must support the same load as the floor is designed to support or must be protected by a permanent barrier to prevent loading or traffic in the smoke or firestopped areas.
  - 2. Electrical Cables or Conduits: Smoke and firestopping at penetrations of electrical cables or conduits must comply with the requirements of NFPA No. 70.
  - 3. Where smoke and firestopping of penetrations in floors, walls and partitions that will be exposed in completed construction, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and provide escutcheons or other trim.
  - 4. Schedule the installation and required inspection of smoke and firestops for penetrations that will be concealed in completed construction prior to erection of floors, walls, and partitions that would permanently conceal the penetrations.
- C. All areas of smoke and firestopping installation must be accessible until inspection by the applicable code authorities.

### **3.16 SUBSURFACE CONCEALED UNKNOWN PHYSICAL CONDITIONS**

- A. Subsurface, or otherwise concealed physical conditions which (1) do not differ materially from those indicated in the Project Contract Documents; (2) affect electrical work; (3) do not differ materially from those ordinarily found to exist, and which are generally recognized as inherent in the electrical construction activities of the character provided for in the Project Contract Documents, are to be anticipated by the Electrical Trade Contractor, and included in the basic electrical work.
- B. Unknown physical conditions: which are of an unusual nature; which are materially different in subsurface (otherwise concealed) physical conditions; which affect mechanical and/or electrical work; which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character found in the Project Contract Documents, are the basis for, and require notice by, the applicable Trade Contractor, promptly, before such conditions are disturbed. Such conditions may become the basis for a legitimate claim under "Changed Conditions," affecting the cost, and/or schedule of the work. During the work, the Electrical Trade Contractor shall provide reasonable, incidental on-site review, survey and measurements to assist in quantification of such conditions.

### **3.17 INITIAL APPLICATION FOR PAYMENT**

- A. Provide the following prior to submitting the initial application for payment:

1. Copy of the Electrical Trade Contractor's and Sub-Contractors' licenses for the state in which the work is being performed.
  2. Resumes for the designated Project Manager and Project Foreman.
  3. List of independent agencies who will be engaged by the Electrical Trade Contractor to perform tests, provide certifications, conduct inspections, etc. as required by Contract Documents.
- B. The initial application for payment will not be processed until the items above are submitted.

### **3.18 FINAL APPLICATION FOR PAYMENT**

- A. Provide the following prior to submitting the final application for payment:
1. Refer to general construction contract documents of these specifications.
  2. Equipment Start-Up Reports for each piece of electrical equipment.
  3. Electrical Inspection Agency's written report.
  4. Operating and Maintenance Manuals and Data.
  5. Electrical systems and equipment warranties.
  6. Electrical System Commissioning Report.
  7. Electrical Trade Contractor's Punch List of incomplete work items with reason why each work item is not complete and anticipated schedule for completion. Submit at least one week prior to Engineer's final Construction Observation Report site visit.
  8. Electrical Trade Contractor's notarized certification letter.
  9. As-built drawings as described in Part 1 of this specification section.
- B. Final payment is contingent upon completion of all items listed above.

### **3.19 ADDITIONAL ELECTRICAL TRADE CONTRACTOR PAID FEES AND EXPENSES**

- A. As a material part of the Electrical Trade Contractor's Agreement to complete the work of this Contract, the Electrical Trade Contractor agrees to reimburse Gillan & Hartmann, Inc. ("Design Professional") for the below listed extra engineering work under the following conditions:
1. Design Professional's hourly billing rate shall be \$150.00 per hour for all related office hours, travel time and as applicable, on-site time;
  2. Electrical Trade Contractor's request(s) for substitution;
    - a. When such requests for substitution are not the result of a bonafide delivery problem or design related problem, and;
    - b. When such requests do not address items of equipment for which the specifications list the basis of design with at least one comparable product, and;
    - c. The Electrical Trade Contractor's request(s) for substitution must be submitted in writing, and;
    - d. The Electrical Trade Contractor agrees to compensate the Design Professional \$1,500.00 (per diem) for the review of each proposed substitution;
    - e. The Electrical Trade Contractor shall render written acceptance of the Design Professional's extra charges, and;

- f. Any balance not paid will be deducted from contractors final payment.
3. Extra Design Professional work created by the Electrical Trade Contractor's multiple submissions of a single material or piece of equipment;
- a. The Design Professional's basic services include two reviews for each piece of equipment or material submittal. The Design Professional's first review takes place at the initial Electrical Trade Contractor's submission of that submittal. The Design Professional's second review takes place when the Design Professional requires a resubmission of that submittal.
  - b. If the Design Professional's third review of a particular submittal is required for reasons due to the Electrical Trade Contractor, the Trade Contractor agrees to compensate the Design Professional \$1,500.00 for each submittal review.
  - c. Any unpaid balance due will be deducted from the Trade Contractors final payment.
4. Extra work created by the Electrical Trade Contractor resolution of substantial completion and final completion construction observation reports and project closeout documentation:
- a. The Design Professional's basic services rendered to the Owner include periodic visits to the site and providing written list of items (Construction Observation Report) requiring the Electrical Trade Contractor's attention, reporting and resolution;
  - b. The Electrical Trade Contractor shall provide written feedback and prompt resolution of Construction Observation Items including a written schedule for the Electrical Trade Contractor's completion of these Items followed by a written confirmation of closure;
  - c. The contract documents specify the Electrical Trade Contractor's requirements including written notification of substantial completion, including contractor's prepared punch list of items to be completed;
  - d. The Design Professional services include: the preparation of one (1) substantial completion/final completion observation report; and one (1) review of the Electrical Trade Contractor's resolution of the substantial completion/final completion observation report.
  - e. The Electrical Trade Contractor agrees to compensate the Design Professional \$1,500.00 (per diem) for the preparation of additional substantial completion/final completion reports as required to achieve final completion.
  - f. Any unpaid balance will be deducted from the contractor's final payment.

3.20 FORMS

Date: 5/25/2016

GILLAN HARTMANN, INC. REQUEST FOR PROFESSIONAL'S REVIEW/COMMENT  
 140 Whitaker Avenue, Mont Clare, PA 19453 PROPOSED MANUFACTURERS SUB-CONTRACTORS LIST

Project No.: \_\_\_\_\_  
 Contract No.: \_\_\_\_\_  
 Project Title: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Contractor's Authorized Staff Signature: \_\_\_\_\_  
 Print Name: \_\_\_\_\_

1.) LIST OF ABBREVIATORS (ABB): **MFR:** MANUFACTURER **SUB:** SUBCONTRACTOR **SUBST:** SUBSTITUTION  
**TEST:** TESTING AGENCY **WELD:** WELDER **CERT:** CERTIFICATION  
**FAB:** FABRICATOR **SUP:** SUPPLIER

- 2.) SIGNIFY BY **X**, IF PRODUCT IS BASIS OF DESIGN, AS DEFINED IN THE CONTRACT DOCUMENTS;
- 3.) SIGNIFY BY **X**, IF PRODUCT A LISTED MANUFACTURER (VARIATION), AS DEFINED IN THE CONTRACT DOCUMENTS; LIST MANUFACTURER
- 4.) SIGNIFY BY **X**, IF PRODUCT IS A COMPARABLE PRODUCT, I.E. NON-LISTED IN THE CONTRACT DOCUMENTS (SUBSTITUTION), AS DEFINED IN THE CONTRACT DOCUMENTS; CERTIFICATION OF COMPARABLE PRODUCT FROM MANUFACTURER MUST BE ATTACHED. INCLUDE ASSOCIATED DOCUMENTATION REQUIRED BY THE CONTRACT DOCUMENTS.
- 5.) SIGNIFY BY **Y** OR **N**, IF PROPOSED SUBCONTRACTOR IS AN INDEPENDENT AGENT WITH NO CONFLICT OF INTEREST WITH CONTRACTOR.

CONTRACTOR NAME AND ADDRESS:				ADDITIONAL SUBMITTAL INFORMATION REQUESTED BY PROFESSIONAL, BASED ON INITIAL SUBMISSIONS								
Material or Work; Indicate associated Specifications Section (Page#) Para.	ABB (1)	Basis of Design (2)	Listed Manufacturer/ Variation (3)	Comparable Product/ Substitution (4)	Name & Address	Relation to Contractor Y or N (5)	FOR PROF. USE ONLY					
							Submit (8)	Step Due	Subst. Info.	None Resubmitted	Proceed Submittal	REJ
EXAMPLE: Hydraulic Piping - Section 6510.2.2	SUP	X			1/2 PIPING, 204 MAIN ST, SMALL TOWN, US-XXXXX	N		X				

REVIEWED:

SIGNATURE OF PROFESSIONAL

\_\_\_\_\_/\_\_\_\_/\_\_\_\_

PROJECT NAME:  
 Gillan Hartmann, Inc.  
 ELECTRICAL SHOP DRAWING LOG

JOB NO.:  
 DATE: 5/25/2016

ITEM NO.	PROPOSED DATE OF	ACTUAL DATE OF SUBMITTAL	MFR. OR CONTRACTOR	DESCRIPTION	DESIGN PROFESSIONAL'S ACTION	DATE RETURNED	RE-SUBMIT	Checked by
E-01								
E-02								
E-03								
E-04								
E-05								
E-06								
E-07								
E-08								
E-09								
E-10								
E-11								
E-12								
E-13								
E-14								
E-15								
E-16								
E-17								
E-18								
E-19								

Status: Pending (P); Furnish as Submitted (FAS) Furnish As Noted (FAN); Rejected (RE); No Submission Required (NSR)

Contractor's Submittal Description: \_\_\_\_\_, Project \_\_\_\_\_  
(Fill In) (Fill In)

## ELECTRICAL CONTRACTOR'S TRANSMITTAL COVER SHEET

**TO: GILLAN & HARTMANN, INC.**  
CONSULTING ENGINEERS  
P.O. BOX 345  
VALLEY FORGE, PENNSYLVANIA 19481

Date of Transmittal: _____	By Contractor: _____ Contractor's Authorized Staff Signature: _____ Print Name: _____ Project: _____
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By executing this Transmittal Cover, the Contractor agrees and accepts that:

- Submittals without the HVAC/Plumbing/Fire Protection and Electrical Contractor's signed stamp of approval will not be reviewed. Initialed approval stamps are not acceptable. All resulting resubmittals will be provided at the Contractor's expense.
- The Engineer's recommendation of acceptance ("Furnish as Submitted", "Furnish as Noted Below", etc.) of the equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:
  - The Contractor has completed field layout and planning of proposed equipment and has coordinated all other related shop drawings, related trades involved in Project Construction, and all space requirements.
  - The Contractor has examined all shop drawings prior to submission. The Contractor forwards all shop drawings with a signed approved stamp, signifying the following:
    - 1) All field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data have been verified.
    - 2) The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors' Field Decisions;
    - 3) All items herein are approved by the Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements;
    - 4) Submission is clearly marked to indicate which manufacturer's options are provided and which are not provided with the proposed equipment.
  - Any and all exceptions requested by the HVAC/Plumbing/Fire Protection and Electrical Contractors have been included in written form. All exceptions, deletions, and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide the initialed annotations for all deletions and additions, the Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.
  - All Engineer's notes regarding this submission must be incorporated into the Project.
  - The Engineer's review is limited to comparison of the technical performance of the Contractor's proposed equipment to the specified technical performance.
  - Equipment submittal is either the Basis-of-Design, or a comparable product to the Basis-of-Design.
  - A Comparable Product must meet or exceed all the salient characteristics and standards necessary including, but not limited to: material of manufacture; independent testing agency certifications; quality; function; design; and performance required to meet the Owner's needs and meet the objectives of the Professional's Project Design.
  - Extension of Contract Time and/or claim for delay are not acceptable as created by the Trade Contractor's failure to provide submittals on a timely basis to permit the processing work of the Professional, including multiple resubmittals, and/or failure to provide submittals that are comparable to the Basis of Design Product. Refer to EQUIPMENT VARIATIONS AND SUBSTITUTIONS article in the General Requirements Section of the Specifications.

G&H Project No: \_\_\_\_\_

G&H Shop Drawing Review No: \_\_\_\_\_ E-\_\_\_\_\_



Contractor's Submittal Description: \_\_\_\_\_, Project \_\_\_\_\_  
(Fill In) (Fill In)

**HVAC AND ELECTRICAL TRADES'  
 COORDINATION OF HVAC EQUIPMENT  
 ELECTRICAL REQUIREMENTS  
 TRANSMITTAL COVER SHEET**

**TO: GILLAN & HARTMANN, INC.**  
 CONSULTING ENGINEERS  
 P.O. BOX 345  
 VALLEY FORGE, PENNSYLVANIA 19481

By HVAC Trade Rep: _____	By Electrical Trade Rep: _____
Contractor's Authorized Staff Signature: _____	Contractor's Authorized Staff Signature: _____
Print Name: _____	Print Name: _____
Date of Transmittal: _____	Date of Transmittal: _____

By executing this Transmittal Cover, the Contractor agrees and accepts that:

1. Submittals without the HVAC and Electrical Trades' signed stamp of approval will not be reviewed. Initialed approval stamps are not acceptable. All resulting resubmittals will be provided at the Contractor's expense.
  
2. The HVAC Trade Representative has submitted the attached HVAC Equipment Submittal to the Electrical Trade Representative for examination, review, and coordination of the attached HVAC Equipment Electrical Requirements. The equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:
  - A. The Contractor has completed field layout and planning of proposed equipment and has coordinated all other related submittals, related Trades involved in Project Construction, and all space requirements.
  - B. The HVAC and Electrical Trades have examined all submittals prior to submission. The HVAC and Electrical Trades forwards all submittals with a signed transmittal stamp, signifying the following:
    - 1) All field measurements, field construction criteria, electrical power requirements and similar data have been verified;
    - 2) The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors' Field Decisions;
    - 3) All items herein are approved by the Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements;
    - 4) Submission is clearly marked to indicate which manufacturer's options are provided and which are not provided with the proposed equipment.
  - C. Any and all exceptions requested by the HVAC and Electrical Trades have been included in written form. All exceptions, deletions, and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide the initialed annotations for all deletions and additions, the Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.

G&H Project No: \_\_\_\_\_

G&H Shop Drawing Review No: \_\_\_\_\_

Contractor's Submittal Description: \_\_\_\_\_, Project \_\_\_\_\_  
(Fill In) (Fill In)

**PLUMBING AND ELECTRICAL TRADES'  
COORDINATION OF PLUMBING EQUIPMENT  
ELECTRICAL REQUIREMENTS  
TRANSMITTAL COVER SHEET**

**TO: GILLAN & HARTMANN, INC.**  
CONSULTING ENGINEERS  
P.O. BOX 345  
VALLEY FORGE, PENNSYLVANIA 19481

<b>By Plumbing Trade Rep:</b> _____ <b>Contractor's Authorized Staff Signature:</b> _____ <b>Print Name:</b> _____ <b>Date of Transmittal:</b> _____	<b>By Electrical Trade Rep:</b> _____ <b>Contractor's Authorized Staff Signature:</b> _____ <b>Print Name:</b> _____ <b>Date of Transmittal:</b> _____
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By executing this Transmittal Cover, the Contractor agrees and accepts that:

1. Submittals without the Plumbing and Electrical Trades' signed stamp of approval will not be reviewed. Initialed approval stamps are not acceptable. All resulting resubmittals will be provided at the Contractor's expense.
2. The Plumbing Trade Representative has submitted the attached Plumbing Equipment Submittal to the Electrical Trade Representative for examination, review, and coordination of the attached Plumbing Equipment Electrical Requirements. The equipment proposed by the Contractor is conditional upon the Contractor fulfilling all obligations of the Contract Documents. By furnishing the proposed equipment, the Contractor acknowledges compliance with all of the following:
  - A. The Contractor has completed field layout and planning of proposed equipment and has coordinated all other related submittals, related Trades involved in Project Construction, and all space requirements.
  - B. The Plumbing and Electrical Trades have examined all submittals prior to submission. The Plumbing and Electrical Trades forwards all submittals with a signed transmittal stamp, signifying the following:
    - 1) All field measurements, field construction criteria, electrical power requirements and similar data have been verified;
    - 2) The Architect/Engineer has been notified of all site conditions which affect the work, and which require design resolution beyond resolution by Trade contractors' Field Decisions;
    - 3) All items herein are approved by the Contractor, and have been coordinated and checked with other applicable submittals, and contract requirements;
    - 4) Submission is clearly marked to indicate which manufacturer's options are provided and which are not provided with the proposed equipment.
  - C. Any and all exceptions requested by the Plumbing and Electrical Trades have been included in written form. All exceptions, deletions, and additions that vary from the Contract Documents have been specifically annotated and initialed. Failing to provide the initialed annotations for all deletions and additions, the Contractor accepts the condition that the Contract Documents will govern, and will be used to resolve disputes.

G&H Project No: \_\_\_\_\_

G&H Shop Drawing Review No: \_\_\_\_\_

END OF SECTION 260010

## **SECTION 260050 - BASIC ELECTRICAL MATERIALS AND METHODS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Supporting devices for electrical components.
  - 2. Electrical identification.
  - 3. Electricity-metering components.
  - 4. Concrete equipment bases.
  - 5. Electrical demolition.
  - 6. Cutting and patching for electrical construction.
  - 7. Touchup painting.

#### **1.3 SUBMITTALS**

- A. Product Data: For electricity-metering equipment.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

#### **1.4 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

## **1.5 COORDINATION**

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
  - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
  - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
  - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08 Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.
- G. Electrical devices and boxes are indicated on Drawings in approximate locations unless dimensioned. Adjust box or device location up to 10 feet, if required to accommodate intended purpose or owner request, with no additional cost to contract.

## **PART 2 - PRODUCTS**

### **2.1 SUPPORTING DEVICES**

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- (14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.
  - 1. Channel Thickness: Selected to suit structural loading.
  - 2. Fittings and Accessories: Products of the same manufacturer as channel supports.
- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, and wall brackets.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel springhead type.
- I. Powder-Driven Threaded Studs: Heat-treated steel.

## **2.2 ELECTRICAL IDENTIFICATION**

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
  - 1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over laminated with a clear, weather- and chemical-resistant coating.
  - 2. Color: Black letters on orange background.
  - 3. Legend: Indicates voltage.
- C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
  - 1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
  - 2. Compounded for permanent direct-burial service.

3. Embedded continuous metallic strip or core.
  4. Printed legend that indicates type of underground line.
- E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
  - F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
  - G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.
  - H. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
  - I. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6-mm) grommets in corners for mounting.
  - J. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

### **2.3 CONCRETE BASES**

- A. Concrete Forms and Reinforcement Materials: As specified in Division 03 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Division 03 Section "Cast-in-Place Concrete."

### **2.4 TOUCHUP PAINT**

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

## **PART 3 - EXECUTION**

### **3.1 ELECTRICAL EQUIPMENT INSTALLATION**

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

### **3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION**

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

### **3.3 SUPPORT INSTALLATION**

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch (38-mm) and smaller raceways

serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
  - 1. Wood: Fasten with wood screws or screw-type nails.
  - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
  - 3. New Concrete: Concrete inserts with machine screws and bolts.
  - 4. Existing Concrete: Expansion bolts.
  - 5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
  - 6. Steel: Welded threaded studs or spring-tension clamps on steel.
    - a. Field Welding: Comply with AWS D1.1.
  - 7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
  - 8. Light Steel: Sheet-metal screws.
  - 9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

### **3.4 IDENTIFICATION MATERIALS AND DEVICES**

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.



- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
  - 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
  - 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.
  - 3. Apply the following colors to the systems listed below:
    - a. Fire Alarm System: Red.
    - b. Fire-Suppression Supervisory and Control System: Red and yellow.
    - c. Combined Fire Alarm and Security System: Red and blue.
    - d. Security System: Blue and yellow.
    - e. Mechanical and Electrical Supervisory System: Green and blue.
    - f. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.
- G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
  - 1. Phase A: Black.
  - 2. Phase B: Red.
  - 3. Phase C: Blue.
  - 4. Neutral: White.
  - 5. Ground: Green.
- H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
  - 1. Phase A: Yellow.

2. Phase B: Brown.
  3. Phase C: Orange.
  4. Neutral: White with a colored stripe or gray.
  5. Ground: Green.
- I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
  - J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
  - K. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high lettering on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:
    1. Panelboards, electrical cabinets, and enclosures.
    2. Access doors and panels for concealed electrical items.
    3. Electrical switchboards.
    4. Disconnect switches.
    5. Enclosed circuit breakers.
    6. Motor starters.
    7. Push-button stations
    8. Contactors.
    9. Control devices.
    10. Transformers...
  - L. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm) overall, use a single line marker.

### **3.5 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT**

- A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

### **3.6 FIRESTOPPING**

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Firestopping."

### **3.7 CONCRETE BASES**

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

### **3.8 DEMOLITION**

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

### **3.9 CUTTING AND PATCHING**

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

### **3.10 FIELD QUALITY CONTROL**

- A. Inspect installed components for damage and faulty work, including the following:
  - 1. Raceways.

2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

### **3.11 REFINISHING AND TOUCHUP PAINT**

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 09 Section "Painting."
  1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### **3.12 CLEANING AND PROTECTION**

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

**END OF SECTION 260050**

## **SECTION 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Copper building wire rated 600 V or less.
  - 2. Metal-clad cable, Type MC, rated 600 V or less.
  - 3. Connectors, splices, and terminations rated 600 V and less.

#### **1.3 DEFINITIONS**

- A. VFC: Variable-frequency controller.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.

#### **1.6 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**

### **2.1 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. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors. Minimum size #12 AWG .
- D. Conductor Insulation:
  - 1. Type THHN and Type THWN-2: Comply with UL 83.
  - 2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
- E. Shield:
  - 1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.

### **2.2 METAL-CLAD CABLE, TYPE MC**

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. 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. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Ground Conductor: Insulated.
- E. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
- F. Armor: Steel, interlocked.

### **2.3 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. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
1. Material: Copper.
  2. Termination: Compression.

## **PART 3 - EXECUTION**

### **3.1 CONDUCTOR MATERIAL APPLICATIONS**

- A. Feeders: Copper; solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

### **3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS**

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway. Type MC cable can be provided in lieu of wires in raceways where acceptable to applicable codes and to the Authority Having Jurisdiction.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- F. VFC Output Circuits: Type TC-ER cable with dual tape shield.

### **3.3 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 260050 "Basic Electrical Materials and Methods."

### **3.4 CONNECTIONS**

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

### **3.5 IDENTIFICATION**

- A. Identify and color-code conductors and cables according to Section 260050 "Basic Electrical Materials and Methods."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### **3.6 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 260050 "Basic for Electrical Materials and Methods."



### **3.7 FIRESTOPPING**

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

### **3.8 FIELD QUALITY CONTROL**

- A. Perform tests and inspections.
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 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 splice 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.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

**END OF SECTION 260519**

## **SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

#### **1.3 DEFINITIONS**

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

#### **1.4 SUBMITTALS**

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Custom enclosures and cabinets.
  - 2. For handholes and boxes for underground wiring, including the following:

- a. Duct entry provisions, including locations and duct sizes.
- b. Frame and cover design.
- c. Grounding details.
- d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
- e. Joint details.

## **1.5 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

## **1.6 COORDINATION**

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension systems with other construction that penetrates ceilings or is supported by them, including but not limited to lighting fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

## **PART 2 - PRODUCTS**

### **2.1 METAL CONDUITS AND FITTINGS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Electri-Flex Co.
  - 4. O-Z Gedney; a unit of General Signal.
  - 5. Wheatland Tube Company.
  - 6. Or approved equal in accordance with the project substitution provisions of the contract.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT: ANSI C80.3.
- E. FMC: Zinc-coated steel.

- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: Steel, set-screw or compression type.
- H. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

## **2.2 NONMETALLIC CONDUIT AND TUBING**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Arco Corporation.
  - 4. CANTEX Inc.
  - 5. CertainTeed Corp.; Pipe & Plastics Group.
  - 6. Condux International, Inc.
  - 7. ElecSYS, Inc.
  - 8. Electri-Flex Co.
  - 9. Lamson & Sessions; Carlon Electrical Products.
  - 10. Manhattan/CDT/Cole-Flex.
  - 11. RACO; a Hubbell Company.
  - 12. Thomas & Betts Corporation.
  - 13. Or approved equal in accordance with the project substitution provisions of the contract.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

## **2.3 METAL WIREWAYS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Square D; Schneider Electric.
  - 4. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type, unless otherwise indicated.
- C. Fittings and Accessories: Include 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.
- D. Wireway Covers: Hinged type Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

## **2.4 SURFACE RACEWAYS**

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Thomas & Betts Corporation.
    - b. Walker Systems, Inc.; Wiremold Company (The).
    - c. Wiremold Company (The); Electrical Sales Division.
    - d. Or approved equal in accordance with the project substitution provisions of the contract.

## **2.5 BOXES, ENCLOSURES, AND CABINETS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. EGS/Appleton Electric.
  - 3. Erickson Electrical Equipment Company.
  - 4. Hoffman.
  - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
  - 6. O-Z/Gedney; a unit of General Signal.
  - 7. RACO; a Hubbell Company.
  - 8. Robroy Industries, Inc.; Enclosure Division.
  - 9. Scott Fetzer Co.; Adalet Division.
  - 10. Spring City Electrical Manufacturing Company.
  - 11. Thomas & Betts Corporation.
  - 12. Walker Systems, Inc.; Wiremold Company (The).
  - 13. Woodhead, Daniel Company; Woodhead Industries, inc. Subsidiary.
  - 14. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access Pull, and Junction Boxes: NEMA FB 1, galvanized, cast-iron, unless otherwise indicated.
- F. Hinged-Cover Enclosures: NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- G. Cabinets:
  - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.

## **2.6 SLEEVES FOR RACEWAYS**

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052-or-0.138 inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."

## **2.7 SLEEVE SEALS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Advance Products & Systems, Inc.
  - 2. Calpico, Inc.
  - 3. Metraflex Co.
  - 4. Pipeline Seal and Insulator, Inc.
  - 5. Or approved equal in accordance with the project substitution provisions of the contract.

- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
  - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
  - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## **PART 3 - EXECUTION**

### **3.1 RACEWAY APPLICATION**

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: Rigid steel conduit or IMC.
  - 2. Concealed Conduit, Aboveground: Rigid steel conduit or IMC.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
  
- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed: EMT
  - 2. Exposed and Subject to Sever Physical Damage: Rigid steel conduit, IMC. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
  - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.and whips to systems furniture .
  - 5. Damp or Wet Locations: IMC.
  - 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
  
- C. Minimum Raceway Size: 3/4-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.



### **3.2 INSTALLATION**

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
  - 1. 1-inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
  - 2. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where otherwise required by NFPA 70.
- N. Flexible Conduit Connections: Use a maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  - 1. Use LFMC in damp or wet locations.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

### **3.3 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 Division 02 Section "Earthwork" for pipe less than 6 inches in nominal diameter.
  - 2. Install backfill as specified in Division 02 Section "Earthwork."
  - 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 Division 02 Section "Earthwork."
  - 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.
    - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60-inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

### **3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve minimum Metal Thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50-inches and no side greater than 16-inches, thickness shall be 0.052 inch.
  - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than. 16-inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2-inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Through-Penetration Firestop Systems."
- L. Roof-Penetrations Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

### **3.5 SLEEVE-SEAL INSTALLATION**

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### **3.6 FIRESTOPPING**

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Through-Penetration Firestop Systems."

### **3.7 PROTECTION**

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION 260533**

## **SECTION 265119 - LED EXTERIOR LIGHTING**

### **PART 1 – GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Exterior LED lighting fixtures.

#### **1.3 DEFINITIONS**

- A. CRI: Color-rendering index.
- B. CU: Coefficient of utilization.

#### **1.4 SUBMITTALS**

- A. LED Light Fixture Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.
  - 2. Include confirmation that the light fixtures being provided are either DLC listed or confirmation that a DLC listed fixture is not obtainable for the light fixture.
  - 3. The shop drawing shall include the “L70 Rating” for each light fixture, indicating compliance with a minimum L70 of 50,000 hours.
  - 4. The shop drawing shall indicate, for exterior light fixtures, a rated ambient temperature of 15 degrees-C or lower.
  - 5. The shop drawing shall include photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for fixtures identical to those required for this project.
  - 6. The shop drawing shall include, for each fixture, the rated driver current, indicating compliance with a maximum value of 2 mA.
  - 7. The shop drawing shall indicate the minimum delivered lumens indicating compliance with the minimum value listed in the light fixture schedule.
  - 8. The shop drawing shall indicate the CRI = Color Rendering Index of the light fixture indicating compliance with the CRI value listed in the light fixture schedule.
  - 9. Shop drawings that do not include each of the above light fixture ratings shall be rejected.
- B. Field quality-control test reports.

- C. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranties: Special warranties specified in this Section.

### **1.5 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

### **1.6 COORDINATION**

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.
- B. The light fixture catalog number indicated on the project documents is to establish the intent of design but does not necessarily include all required accessories and hardware for a complete installation. Prior to shop drawing submission and fixture purchase, coordinate the final requirements for each light fixture with ceiling construction and finish types as required by the Professional and/or the Institution. Coordination to include but not be limited to: ceiling type; supporting methods & hardware; trim; accessories; fixture finish and color. Submission of bid indicates inclusion of all material and installation as required by these coordination requirements.

### **1.7 WARRANTY**

- A. LED light fixtures provided as a part of this project shall be provided with a 5 year warranty.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 2. Basis-of-Design Product: The design for each lighting fixture is based on the product named in the Lighting Fixture Schedule shown on drawings. Subject to compliance with requirements, provide either the named product, a comparable product by one of the other manufacturers specified, or an approved equal.

## **2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS**

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.
- E. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
  - 4. Laminated Silver Metallized Film: 90 percent.
- F. Plastic Diffusers, Covers, and Globes:
  - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
    - b. UV stabilized.
  - 2. Glass: Annealed crystal glass, unless otherwise indicated.

## **2.2 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES**

- A. Fixtures Characteristics: As shown on the drawings.

## **2.3 LED LIGHT FIXTURES**

- A. LED light fixtures provided as a part of this project shall have a minimum L70 rated life of 50,000 hours. The shop drawing submitted for these fixtures shall include this information.
- B. The maximum driver current for each fixture shall not exceed 2mA.
- C. The power factor of the load for each light fixture shall not exceed a value to cause a 60% loaded 277V light fixture branch circuit to have a power factor less than 0.85.
- D. The LED fixtures shall be provided with the special warranty listed in this specification.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as the primary support element.
  - 1. Install a minimum of four ceiling support system rods or wires for each fixture from the building structure to tabs on the light fixture located not more than 6 inches from the light fixture corner. The wire or rod shall have a breaking strength of the weight of the fixture at a safety factor of 3.
  - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
  - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- C. Suspended Lighting Fixture Support:
  - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
  - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Division 26 Section "Low Voltage Electrical Power Conductors and Cables."

### **3.2 FIELD QUALITY CONTROL**

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

**END OF SECTION 265119**



## **SECTION 283111 – MODIFICATIONS TO THE EXISTING FIRE ALARM SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 STIPULATIONS**

- A. The specification sections "General Conditions", "Special Requirements", and "General Requirements" form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

#### **1.2 RELATED DOCUMENTS**

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

#### **1.3 SUMMARY**

- A. This Section includes requirements for the modification of the existing Siemens fire alarm system at the Greater Egg Harbor Absegami School. The modification include the requirement to remove the fire alarm devices located within the wing of the school that is being demolished and reprogram the fire alarm system as required.
- B. All equipment, programming, and material provided for the fire alarm system shall be fully compatible with the existing Siemens fire alarm system.
- C. Coordinate with the equipment manufacturer for requirements (Contact Siemens Representative John Kile at (856-437-9286) and provide all required equipment, labor and material for the existing fire alarm system to modify the existing system to remove devices indicated on the removal drawings. Include all required costs to modify the system as shown on the drawings.
- D. After the modifications to the existing fire alarm system are complete, test the system in compliance with the requirements of the Local Authority Having Jurisdiction and NFPA 72.

#### **1.4 DEFINITIONS**

- A. FACP: Fire alarm control panel.
- B. LED: Light-emitting diode.
- C. NICET: National Institute for Certification in Engineering Technologies.
- D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

## **1.5 SYSTEM DESCRIPTION**

- A. The Siemens Fire Alarm System-III is a fully addressable system.
- B. Provide Modifications and programming to the existing system when the devices in the wing have been removed.

## **1.6 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Provide shop drawings (as required) that are signed and sealed by a Professional Engineer with the following qualifications:
    - a. Trained and certified by manufacturer in fire alarm system design.
    - b. Fire alarm certified by NICET, minimum Level III.
- C. The shop drawings (as required) shall include signed and sealed (By a NICET qualified Professional Engineer) floorplans (showing the locations of all devices), wiring diagrams, riser diagrams, battery calculations and all additional NFPA 72 requirements.
- D. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 01 Section "Submittals," make an identical submittal to authorities having jurisdiction (Pennsylvania Department of Labor & Industry) for review and approval prior to submission to the Professional. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Professional for review.
- E. Documentation:
  - 1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Institution, Professional, and authorities having jurisdiction.
  - 2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Institution, Professional, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.
    - a. Hard copies on paper to Institution, Professional, and authorities having jurisdiction.

## **1.7 QUALITY CONTROL**

- A. Installer/Programmer Qualifications: Personnel certified by NICET as Fire Alarm Level II.

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

## **1.8 PROJECT CONDITIONS**

- A. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Institution or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
  - 1. Notify District no fewer than five days in advance of proposed interruption of fire alarm service.
  - 2. Do not proceed with interruption of fire alarm service without District's written permission.

## **PART 2 - PRODUCTS**

### **2.1 EXISTING FIRE ALARM SYSTEM**

- A. Provide equipment and programming that is fully compatible with the existing fire alarm system.

## **PART 3 - EXECUTION**

### **3.1 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals according to Division 26.
- B. Install instructions frame in a location visible from the FACP.
- C. Paint power-supply disconnect switch red and label "FIRE ALARM."

### **3.2 GROUNDING**

- A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

### **3.3 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including

connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.
  - a. Include the existing system in tests and inspections.
3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.
5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

### **3.4 ADJUSTING**

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

### **3.5 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Institution's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices.

END OF SECTION 283111

New Bus Parking / Exterior Plaza & Curtain Wall Replacement  
at

# Absegami High School

201 South Wrangleboro Road, Galloway, NJ 08205

## Greater Egg Harbor Regional High School District

1824 Dr. Dennis Foreman Drive, Mays Landing, NJ 08330



**French & Parrello Associates, P.A.**  
Consulting Engineers | Wall, New Jersey

**Gillan & Hartmann, Inc.**  
Consulting Engineers | Mont Clare, Pennsylvania

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1/23/24  
Date  
F V H D P C . C O M

Project Name  
New Bus Parking / Exterior Plaza & Curtain Wall Replacement at Absegami High School

Project Owner Name  
Greater Egg Harbor Regional High School District

Project Location  
Absegami High School  
201 South Wrangleboro Rd  
Galloway, NJ 08205

Project Number  
5369-5  
Project Date  
01.23.2024  
Checked By  
W.D.H.  
Drawn By  
NEH  
Scale  
As Noted

Drawing Name  
Title Sheet and Drawing Index

Revisions		
No.	Date	Description
1	2/9/24	Addendum 1

Drawing Number  
G001

**COORDINATION NOTES - ABSEGAMI HIGH SCHOOL**

- CONTRACTOR IS ADVISED THAT ADDITIONAL WORK WILL BE PERFORMED AT THE SCHOOL UNDER SEPARATE CONTRACTS AT THE SAME TIME AS WORK SHOWN ON THESE DRAWINGS.
- OTHER WORK WILL INCLUDE, BUT IS NOT LIMITED TO, THE FOLLOWING:
  - TENNIS COURT RECONSTRUCTION, INCLUDING FRESHPAVING AND WALKWAYS
  - SOCCER FIELD RECONSTRUCTION AND IRRIGATION
  - RENOVATIONS AT EXISTING FIELD HOUSE
- THE RESPECTIVE CONTRACTORS SHALL COORDINATE OPERATIONS WITH THEIR COUNTERPARTS AS REQUIRED TO FACILITATE AND ACCOMMODATE EACH OTHERS WORK AND MAINTAIN BUILDING SECURITY AND WEATHERTIGHTNESS.

**ELECTRICAL GENERAL REMOVAL NOTES:**

- UNLESS NOTED OTHERWISE, REMOVE THE ELECTRICAL EQUIPMENT LOCATED WITHIN THE INDICATED AREA OF DEMOLITION. REMOVALS INCLUDE BUT IS NOT LIMITED TO ALL LIGHT FIXTURES, WIRING, SWITCHES, STARTERS, CONTROLLERS, ELECTRICAL OUTLETS, AND PANELBOARDS.
- PROVIDE ALL WORK AND COSTS ASSOCIATED WITH THE DISCONNECTION, REMOVAL, RELOCATION, AND DISPOSAL OF THE ELECTRICAL EQUIPMENT THAT IS REQUIRED TO BE DEMOLISHED.
- THE OWNER RETAINS THE FIRST RIGHT TO KEEP ANY REMOVED EQUIPMENT. REVIEW THE DISPOSITION OF ALL EQUIPMENT WITH OWNER PRIOR TO REMOVAL. ALL EQUIPMENT AND OR MATERIAL BEING REMOVED IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE RETAINED, DISPOSED OF, AND REMOVED FROM THE SITE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL GUIDELINES.
- PERFORM ALL REQUIRED PATCHING AND PAINTING AFTER DEMOLITION AS REQUIRED TO RESTORE SURFACES TO MATCH SURROUNDING SURFACE FINISHES.
- REMOVE THE EXISTING FIRE ALARM DEVICES IN THE AREA OF DEMOLITION. REPROGRAM THE FIRE ALARM SYSTEM AS REQUIRED, AND TEST THE SYSTEM AS REQUIRED BY NFPA-72.










**ELECTRICAL GENERAL NOTES :**

- PROVIDE PIPE SLEEVES FOR INSTALLATION OF RACEWAYS AND CABLES THROUGH FIRE RATED WALLS AND CEILING SLABS. ALL CORRIDOR WALLS AND CEILING SLABS SHALL BE ASSUMED TO BE 1-1/2 HOUR RATED. FOR ALL PENETRATIONS PROVIDE FIRE STOPPING USING A UL APPROVED ASSEMBLY FOR THE RESPECTIVE WALL OR SLAB CONSTRUCTION.
- PERFORM ALL CUTTING AND PATCHING NECESSARY TO PERFORM WORK. MATCH EXISTING MATERIALS, FINISHES, FIRE RATINGS, PAINT COLORS, ETC. IN ALL AREAS OF PATCHING.
- PROVIDE FIRE PROOFING AT WALL PENETRATIONS.
- PROVIDE TEMPORARY SUPPORT AND PROTECTION OF EXISTING CEILING MOUNTED EQUIPMENT AND DEVICES INCLUDING BUT NOT LIMITED TO LIGHT FIXTURES, PA SYSTEM SPEAKERS, MOTION DETECTORS, AND ASSOCIATED WIRING WHEN THE CEILING IS BEING REMOVED IN ANY PHASE OF CONSTRUCTION PRIOR TO WORK IN THAT AREA.
- ALL WORK AND INSTALLED EQUIPMENT MUST COMPLY WITH THE NATIONAL ELECTRICAL CODE 2020 EDITION.
- ALL WORK SHALL COMPLY WITH THE STANDARDS OF THE AMERICAN INSURANCE ASSOCIATION, INDUSTRIAL RISK INSURANCE UNDERWRITERS (IRI), FACTORY MUTUAL (FM), OR THE APPLICABLE RATING BUREAU, THE NATIONAL ELECTRICAL CODE (NEC), AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AND ALL OTHER APPLICABLE FEDERAL, STATE, AND LOCAL BUILDING CODES AND THE REQUIREMENTS OF THE PUBLIC UTILITY COMPANIES SERVING THE SITE.
- ENSURE ALL WORK IS IN CONFORMANCE WITH ALL APPLICABLE BUILDING CODES. WORK SHALL BE COMPLETED IN STRICT ACCORDANCE WITH THE LATEST EDITIONS OF THE APPLICABLE CONSTRUCTION CODE, AND ALL OTHER FEDERAL, STATE, AND LOCAL AGENCY REGULATIONS HAVING JURISDICTION OVER THIS PROJECT. IN THE EVENT OF ANY DISCREPANCIES BETWEEN AGENCY REQUIREMENTS, OBSERVE THE MORE STRINGENT OF REQUIREMENTS.
- IDENTIFICATION LABELS FOR ALL SYSTEMS MUST USE THE INSTITUTION'S ROOM NAME AND NUMBER AND NOT THE ROOM NAMES AND NUMBERS ON THE CONTRACT DOCUMENTS. MEET WITH THE INSTITUTION TO REVIEW AND CONFIRM ROOM NAMES AND ROOM NUMBERS PRIOR TO LABELING SYSTEMS.
- TEMPORARILY REMOVE AND RE-INSTALL EXISTING CEILING TILES AS REQUIRED TO FACILITATE THE INSTALLATION OF THE NEW CONSTRUCTION. TEMPORARILY REMOVE AND RE-INSTALL EXISTING CEILING-MOUNTED DEVICES INCLUDING BUT NOT LIMITED TO DIFFUSERS, LIGHT FIXTURES, CAMERAS, AND ASSOCIATED APPURTENANCES. MAINTAIN AND TEMPORARILY SUPPORT EXISTING FIRE ALARM DEVICES AND SPRINKLER HEADS TO MAINTAIN COVERAGE.

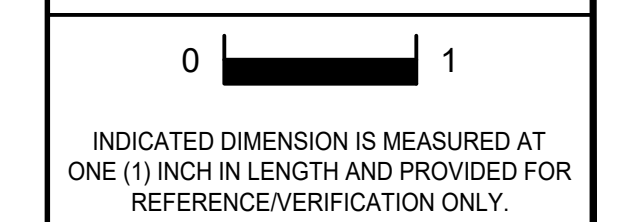
**FIRE ALARM GENERAL NOTES:**

- THE EXISTING FIRE ALARM SYSTEM IS A "SIEMENS" SYSTEM THAT WAS REPLACED IN 2011 AND HAS BEEN MAINTAINED BY SIEMENS FIRE SAFETY BRANCH 10 (800) 234-7666. COORDINATE WITH THE FIRE ALARM SYSTEM VENDOR FOR INFORMATION AND PROVIDE ALL REQUIRED MATERIAL, WIRING, EQUIPMENT, LABOR, PROGRAMMING TO REMOVE EXISTING FIRE ALARM DEVICES, REPROGRAM THE SYSTEM, AND TEST THE SYSTEM AS REQUIRED BY NFPA-72.
- THE SCOPE OF THIS PROJECT INCLUDES THE REMOVAL OF ALL FIRE ALARM DEVICES IN THE INDICATED AREA OF THE BUILDING TO BE DEMOLISHED, THE REQUIRED REPROGRAMMING OF THE SYSTEM, AND TESTING OF THE SYSTEM AS REQUIRED BY NFPA-72.
- THE LOCATION OF THE MAIN FIRE ALARM CONTROL PANEL IS SHOWN IN ELECTRICAL ROOM 921 SHOWN ON DETAIL 1E201.

**ELECTRICAL SYMBOL LEGEND**

-  LIGHT SWITCH
-  ULTRASONIC ANALOG FLUSH CEILING MOUNTED LIGHT CONTROL OCCUPANCY SENSOR
-  NEW EXTERIOR LIGHT MOUNTED 6" ABOVE THE TOP OF THE DOOR OPENING.
-  2' X 4' RECESSED LIGHT INSTALLED IN DROP CEILING.
-  FIRE ALARM INDICATING CEILING MOUNTED HORN WITH STROBE LIGHT.
-  FIRE ALARM MANUAL PULL STATION RECESSED FLUSH MOUNTED IN THE WALL
-  EXISTING MAGNETIC DOOR HOLD OPEN AND RELEASE DEVICE AND ASSOCIATED FIRE ALARM WIRING
-  SEE SHEET REMOVAL NOTE #
-  SEE SHEET NEW WORK NOTE #

**REFERENCE DIMENSION**




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11/26/24  
Date

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Corporate: 1515 Lower Ferry Road - Trenton - New Jersey 08618  
Pennsylvania: 140 Whitaker Ave - Mont Clear - Pennsylvania 19453

Project Name  
New Bus Parking / Exterior  
Plaza & Curtain Wall  
Replacement at  
Absegami High School

Project Owner Name  
Greater Egg Harbor  
Regional High  
School District

Project Location  
Absegami High School  
201 South Wrangleboro Rd  
Galloway, NJ 08205

Project Number  
5369-5

Project Date  
01.23.2024

Checked By  
DLD

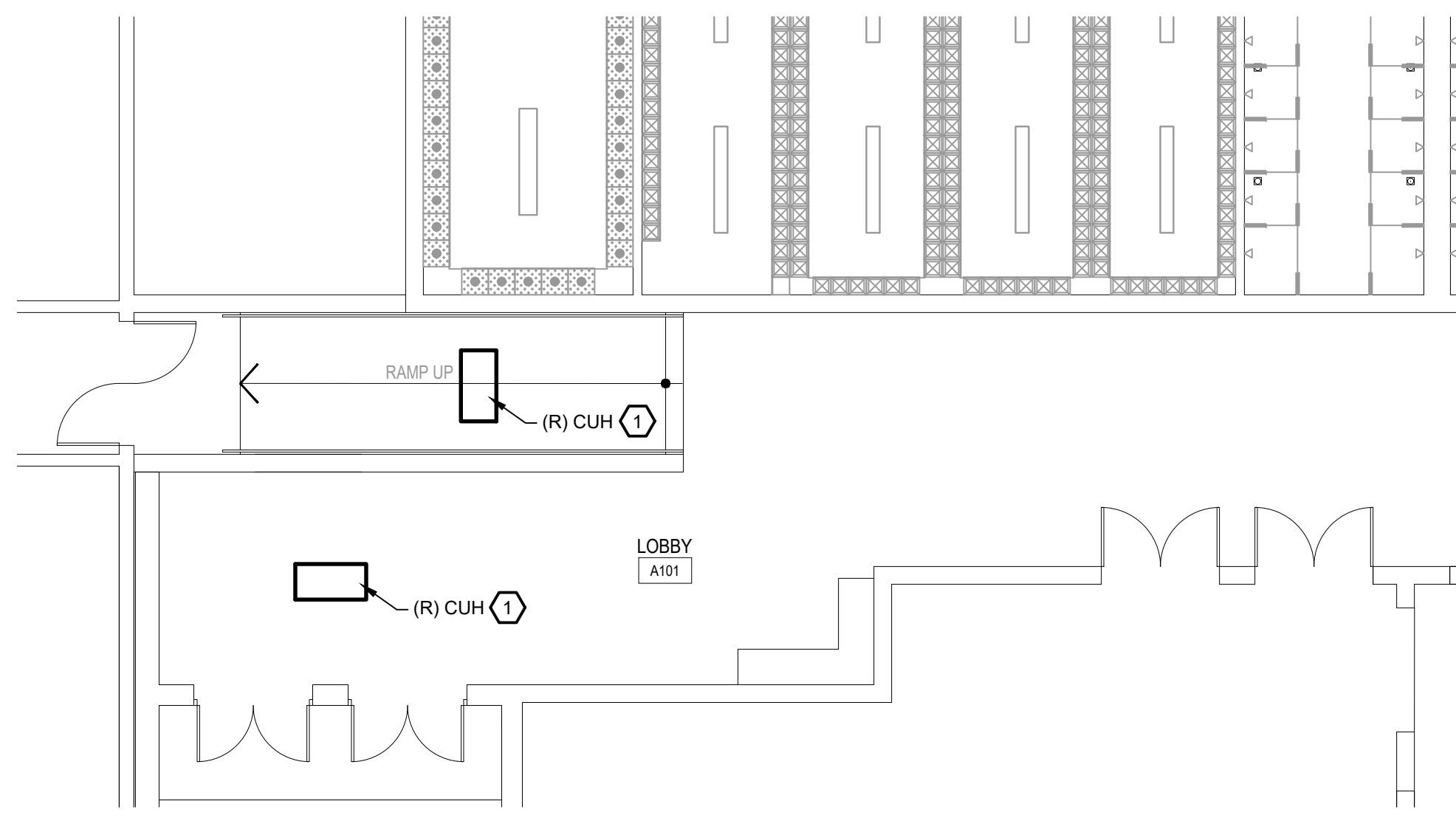
Drawn By  
JEB

Scale  
AS NOTED

Drawing Name  
ELECTRICAL  
LEGEND,  
ABBREVIATIONS,  
GENERAL NOTES,  
DETAILS, AND  
SCHEDULES

Revisions		
No.	Date	Description
1	02.09.24	Addendum 1

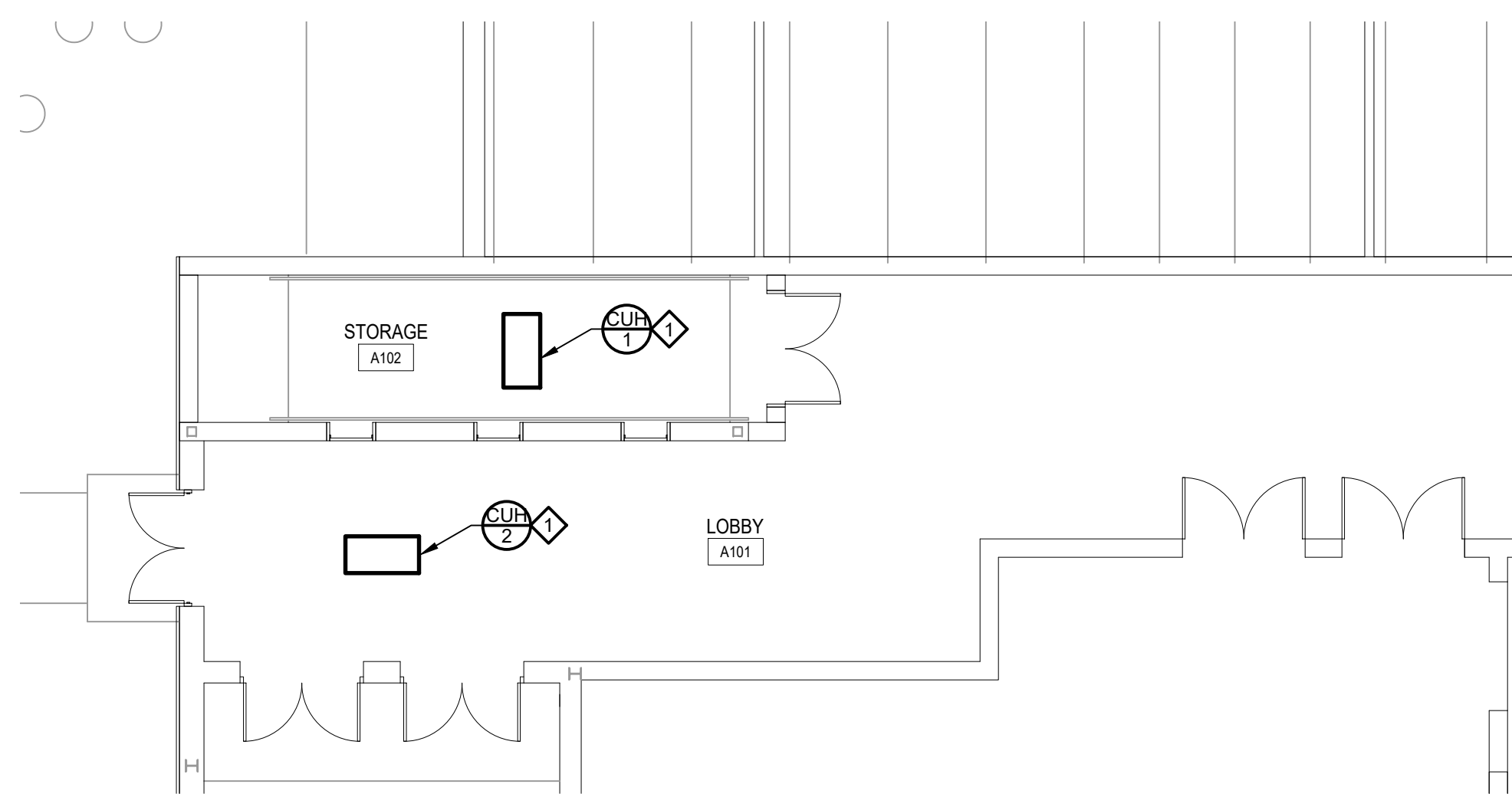
Drawing Number  
E001



**HVAC REMOVAL NOTES:**

- ① CONTRACTOR TO VERIFY IN FIELD EXISTING CEILING MOUNTED RECESSED CABINET UNIT HEATER (CUH) NEAR LOCATION INDICATED AND ASSOCIATED WALL MOUNTED THERMOSTATIC CONTROL. DEMOLISH AND REMOVE CUH INCLUDING ALL ASSOCIATED MOUNTING, ANCHORS, WALL MOUNTED THERMOSTATIC CONTROL AND CONTROL WIRING. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR DE-ENERGIZING AND REMOVAL OF POWER TO CUH. COORDINATE WITH THE GENERAL CONTRACTOR FOR ALL WALL PATCHING AND PAINTING REQUIRED TO MATCH EXISTING.

**ABSEGAMI HIGH SCHOOL  
LOBBY - HVAC REMOVALS**  
SCALE: 1/8" = 1'-0"

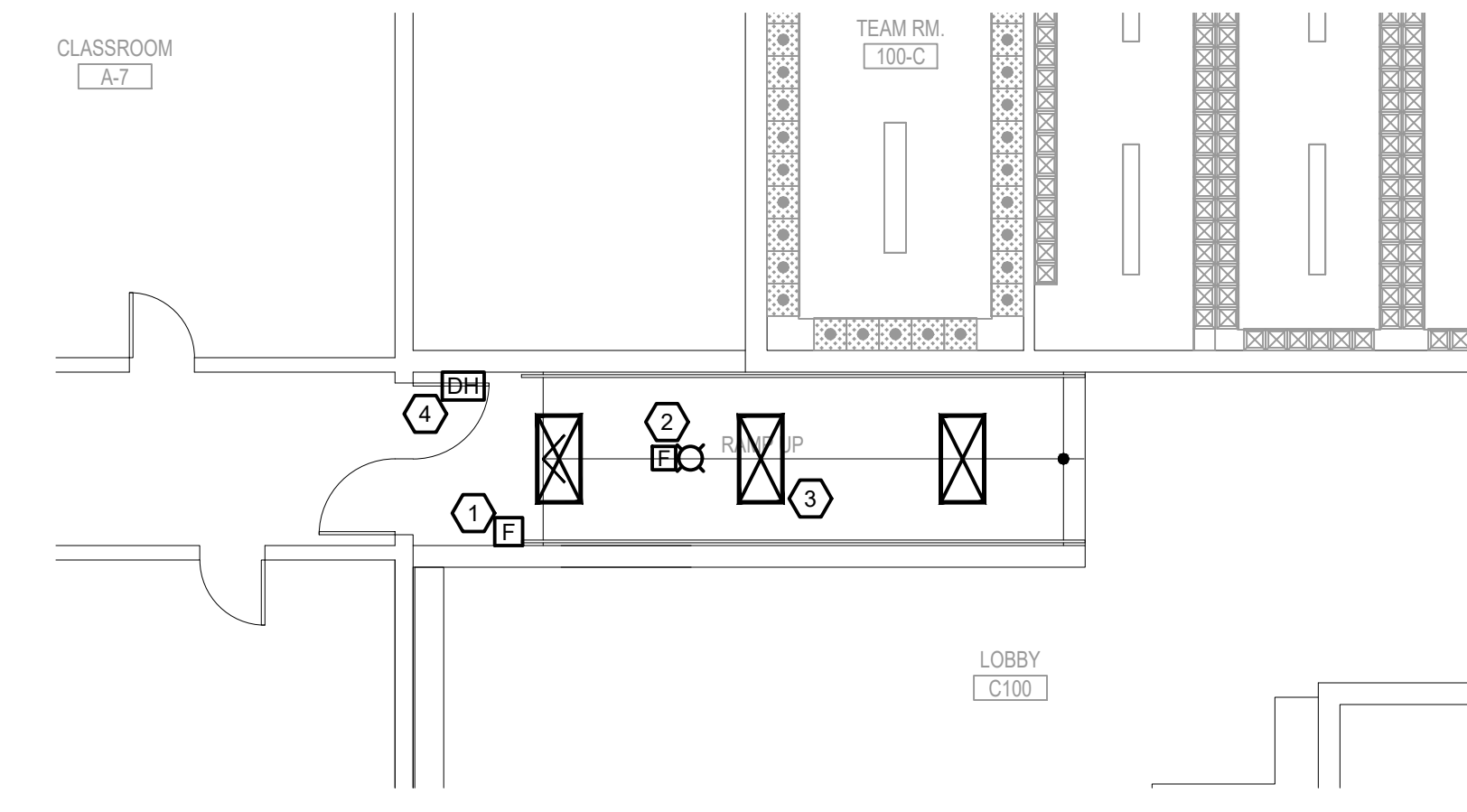


**HVAC NEW WORK NOTES:**

- ② CONTRACTOR TO FURNISH AND INSTALL NEW CABINET UNIT HEATERS (CUH-1 & CUH-2) WITH INTEGRAL THERMOSTATS NEAR LOCATION INDICATED IN EXISTING ACOUSTICAL TILE CEILING. FURNISH MOUNTING AS REQUIRED FOR RECESS INSTALLATION. CUH UNIT FACES SHALL BE FLUSH WITH EXISTING CEILING TILE GRID. COORDINATED POWER CONNECTION AND ENERGIZING WITH THE ELECTRICAL CONTRACTOR.

**ABSEGAMI HIGH SCHOOL  
LOBBY - HVAC NEW WORK**  
SCALE: 1/8" = 1'-0"

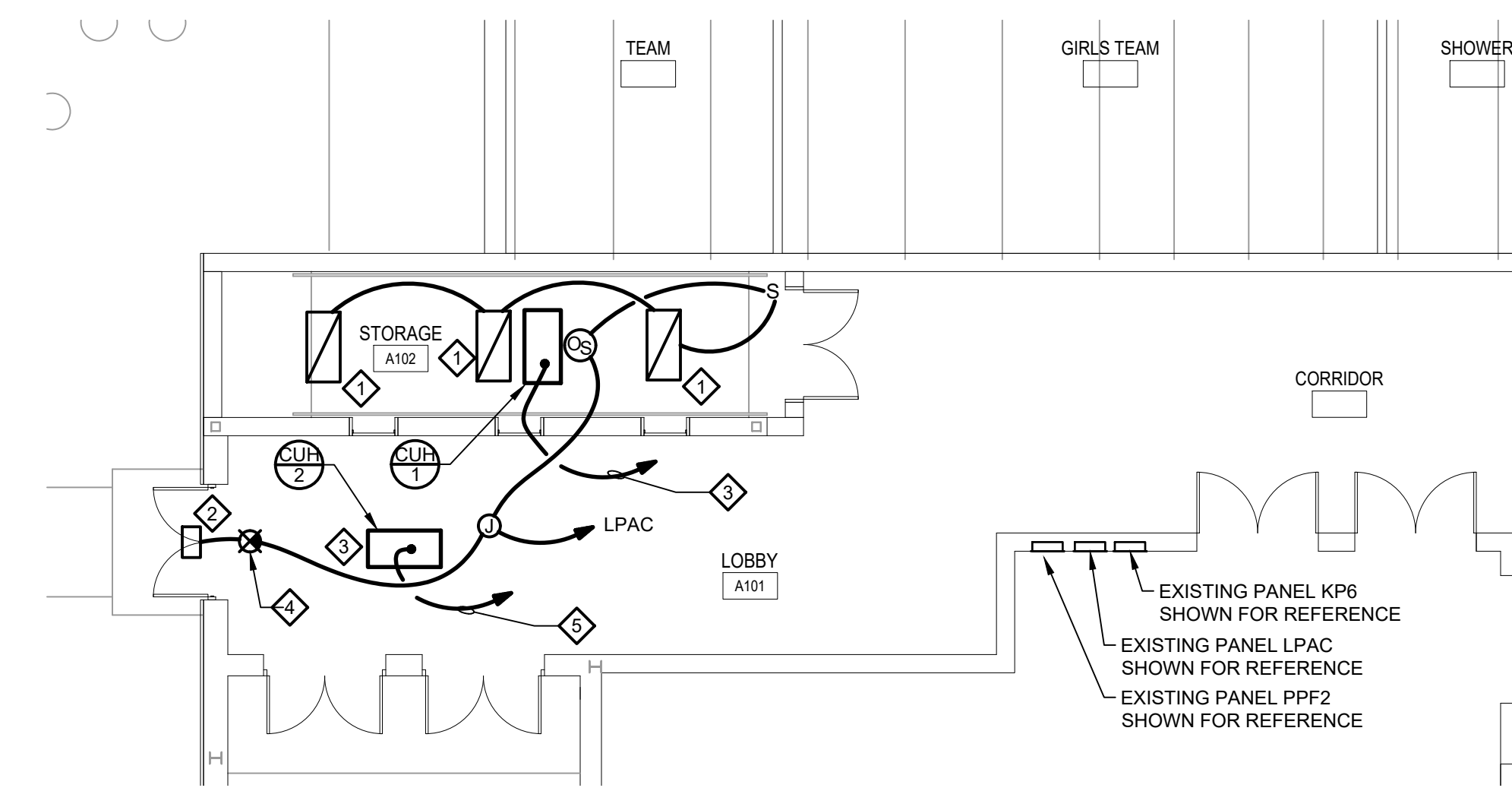
ELECTRIC CABINET UNIT HEATER SCHEDULE											
TAG	AREASERVING	MBH	CFM	TEMP RISE (°F)	KW	MOTOR			MODEL	WEIGHT	NOTES
						HZ	VOLTS	PHASE			
CUH-1	STORAGE A102	10.2	300	42	3	90	208	1	SERIES 500	27 LBS.	(1)(2)(3)(4)
CUH-2	LOBBY A101	17.1	300	42	5	60	208	3	SERIES 500	27 LBS.	(1)(2)(3)(4)
<b>GENERAL NOTES:</b>						<b>BASIS OF DESIGN: MARLEY</b>					
1.	PROVIDE FACTORY MOUNTED & WIRED DISCONNECT SWITCH.										
2.	PROVIDE FACTORY INTEGRAL MOUNTED THERMOSTAT.										
3.	PROVIDE FACTORY RECESSED MOUNTING ENCLOSURE.										
4.	PROVIDE FACTORY INSTALLED AND FIELD ADJUSTABLE DISCHARGE GRILLES.										



**ELECTRICAL REMOVAL NOTES:**

- ① REMOVE EXISTING FIRE ALARM PULL STATION FROM THIS AREA. THIS AREA SHALL BECOME A STORAGE ROOM UNDER NEW WORK.
- ② REMOVE EXISTING FIRE ALARM HORN/STROBE FROM THIS AREA. THIS AREA SHALL BECOME A STORAGE ROOM UNDER NEW WORK.
- ③ EXISTING LIGHT FIXTURES IN THIS AREA SHALL REMAIN IN PLACE. WIRING POWER AND CONTROL SHALL BE CHANGED UNDER NEW WORK.
- ④ REMOVE EXISTING MAGNETIC DOOR HOLDERS FROM THIS AREA. THIS AREA SHALL BECOME A STORAGE ROOM.

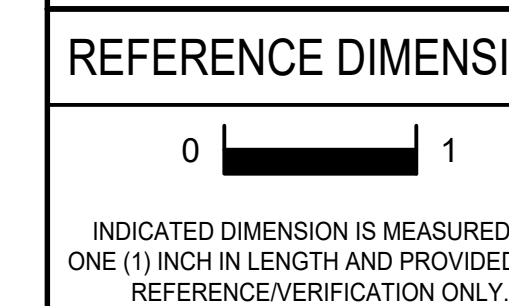
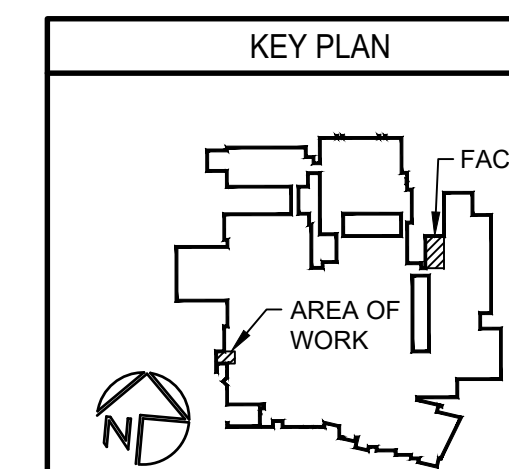
**ABSEGAMI HIGH SCHOOL  
LOBBY - ELECTRICAL REMOVALS**  
SCALE: 1/8" = 1'-0"



**ABSEGAMI HIGH SCHOOL  
LOBBY - ELECTRICAL NEW WORK**  
SCALE: 1/8" = 1'-0"

**ELECTRICAL NEW WORK NOTES:**

- ① DISCONNECT LIGHTS FROM THE CORRIDOR POWER AND CONTROL CIRCUIT. PROVIDE A FLUSH CEILING MOUNTED ANALOG-ULTRASONIC TYPE OCCUPANCY SENSOR (WIRED TO THE LINE SIDE OF THE MANUAL CONTROL SWITCH AND TO THE LIGHT FIXTURES) AND MANUAL SINGLE-POLE CONTROL SWITCH IN THE STORAGE ROOM. STORAGE ROOM LIGHTS SHALL HAVE SEPARATE POWER AND CONTROL FROM LOBBY LIGHTS. POWER FROM UNSWITCHED PORTION OF THE LOBBY LIGHTING CIRCUIT LIGHTS FEED FROM PANEL "LPAC" LOCATED IN THE CAFETERIA TO THE STORAGE ROOM LIGHTS AND CONTROLS.
- ② PROVIDE NEW EXTERIOR LIGHT WILLIAMS MODEL "WVM H-L20740-BLK-SDGL-PC-UNV (OR APPROVED EQUIVALENT), MOUNT FIXTURE 6" ABOVE THE TOP OF THE DOOR OPENING.
- ③ PROVIDE A NEW SINGLE-POLE 20 AMP CIRCUIT BREAKER IN PANEL "PPF2" PROVIDE (3) #12, (1) #12 GROUND, 3/4" CONDUIT FROM CUH-2 TO THE NEW THREE-POLE CIRCUIT BREAKER.
- ④ PROVIDE A NEW CEILING MOUNTED BATTERY BACKUP EXIT SIGN LITHONIA "LOM-S-W-120277V-ELV (BATTERY) OR EQUAL.
- ⑤ PROVIDE A NEW THREE-POLE 20 AMP CIRCUIT BREAKER IN PANEL "PPF2" PROVIDE (3) #12, (1) #12 GROUND, 3/4" CONDUIT FROM CUH-2 TO THE NEW THREE-POLE CIRCUIT BREAKER.



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Date: 11/26/24  
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F V H D P C . C O M

Project Name  
New Bus Parking / Exterior Plaza & Curtain Wall Replacement of Absegami High School

Project Owner Name  
Greater Egg Harbor Regional High School District

Project Location  
Absegami High School  
201 South Wrangleboro Rd  
Galloway, NJ 08205

Project Number  
5369-5  
Project Date  
01.23.2024  
Checked By  
DRH  
Drawn By  
IJA  
Scale  
AS NOTED

Drawing Name  
ABSEGAMI HS - HVAC & ELECTRICAL REMOVALS AND NEW WORK

Revisions  
No. | Date | Description  
1 | 02.09.24 | Addendum 1

Drawing Number  
E101