

PROJECT MANUAL
FOR
**ELEVATOR MODERIZATION AT:
ADAMS COUNTY COURTHOUSE**

PREPARED FOR:
ADAMS COUNTY BOARD
521 Vermont Street
Quincy, Illinois 62301

BY:
ARCHITECHNICS
510 Maine Street
Quincy, Illinois 62301

October 5, 2020

Design Firm 184.004061
Architect / Engineer's Project Number: 5991





Paul T. Westerhoff, AIA
Licensed Architect
State of Illinois License No. 001.020538
License Expires: 11/30/2022

10/5/2020
Date

TITLE PAGE

**PROJECT MANUAL AND
SPECIFICATIONS**

**ELEVATOR MODERNIZATION FOR:
ADAMS COUNTY COURTHOUSE
521 VERMONT STREET
QUINCY, ADAMS COUNTY, ILLINOIS**

ARCHITECTNICS, INC. PROJECT NO. 5991

**OWNER: ADAMS COUNTY BOARD
521 VERMONT STREET
QUINCY, ADAMS COUNTY, ILLINOIS**

**ARCHITECT: ARCHITECTNICS, INC.
510 MAINE STREET
QUINCY, ILLINOIS 62301**

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ADVERTISEMENT FOR BIDS

Sealed Bids will be received by the Adams County Board, Adams County, Illinois for the installation of the following described work, Architechnics, Inc. Project No. 5991.

BASE BID "A"–Elevator Modernization
(Include all related work)

ALTERNATE BID "A-1"–Proprietary Controllers / Equipment
(Include all related work)

BASE BID "B"–General Construction
(Include all related work)

Bids will be received at the place, time and date hereinafter stated.

PLACE: Adams County Board Office
521 Vermont Street
SE Entrance

TIME: 2:00 P.M.

DATE: October 27, 2020

A Pre-Bid Meeting will be held October 12, 2020 at 8:00 A.M. at the site to review the project with prospective bidders. Attendees will meet at the north courthouse parking lot and proceed inside.

DIGITAL AND PAPER Plans and Specifications for bidding purposes are available online at www.architechnicsinc.com (click on the contractors tab) as well as at the offices of the architect, ARCHITECHNICS, INC. 510 Maine St., Quincy, IL 62301, 217-222-0554. A deposit of \$50.00 (paper) will be required for use of the Plans and Specifications for bidding purposes. Any bidder submitting a bid must obtain a paper copy of Plans and Specifications, and be listed on the Plan Holders List to have their bid accepted. **Deposits will be refunded in full, only to those contractors who submit a bona fide bid and to any plan holder who returns the bidding documents to the Architect's office within ten (10) days following the bid opening date.**

Bids shall be accompanied by a Bid Bond in the sum of 5% of the bid. A certified check or bank draft payable to the order of Adams County Highway Department equal to this amount will be an acceptable Bid Bond.

Labor Statutes, Prevailing Wage Rates - In the employment and use of labor, contractors will be required to conform to all Illinois statutory requirements regarding labor and to pay not less than the prevailing rate of wages for all classifications of labor as determined by the Illinois Department of Labor. Prevailing wages are subject to change. The awarded bidder is responsible for maintaining the current wage rates.

Prospective bidders must comply with 30 Illinois Compiled Statutes 570 et seq. regarding preference to Illinois citizens on public works projects.

Awards will be made to the lowest responsible bidder as reasonably determined by the Adams County Board considering conformity with specifications, terms of delivery, quality and serviceability. In evaluating these factors, the Board will necessarily consider and compare (relative to the other bidders) the experience of the bidder on this type of project or similar projects, AND the performance history of the bidder regarding conformity with specifications, meeting terms of delivery and quality of work AND the performance history and ability of the bidder to complete the project on time, to service the product (including response time to service calls) and workmanship on the project. **THE ADAMS COUNTY BOARD IS NOT OBLIGATED TO ACCEPT THE LOWEST DOLLAR BID AND RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS OR TO WAIVE ANY INFORMALITIES, IRREGULARITIES, TECHNICALITIES, OR DEFECTS IN ANY BID SHOULD THE BOARD DEEM IT IN THE BEST INTEREST OF THE COUNTY TO DO SO.**

The bidder shall comply with the applicable provisions of the Illinois Human Rights Act specifically including but not limited to the requirement of 775 ILCS 5/2-105 that every bidder shall have a written sexual harassment policy in place including at a minimum those requirements of such statutory provision.

All work on this project must be completed on or before April 15, 2021.

ADAMS COUNTY BOARD
QUINCY, ADAMS COUNTY, ILLINOIS

DATE: _____

CONTRACTOR'S PROPOSAL

The undersigned offer the following proposal pertaining to Elevator Modernization for the Adams County Courthouse, Quincy, Illinois in accord with the Contract Documents prepared for this work (Project No. 5991) by ARCHITECTNICS, INC., 510 Maine Street, Quincy, Illinois.

The undersigned bidder, having inspected the site of the proposed work and having familiarized himself with all the conditions affecting the work, and having examined the Drawings and Specifications prepared by ARCHITECTNICS, INC. hereby proposes to furnish all labor, materials, equipment, and services for Elevator Modernization for Adams County Courthouse, 521 Vermont Street, Quincy, Illinois.

1. BASE BID "A" – ELEVATOR MODERNIZATION

\$ _____

Total price to provide and install labor and material for the elevator modernization portion of the project as shown on the Drawings, and as specified herein.

2. ALTERNATE BID "A-1" – PROPRIETARY CONTROLLERS / EQUIPMENT

\$ _____

Total price to provide and install labor and material for proprietary elevator equipment in lieu of non-proprietary as shown on the Drawings, and as specified herein.

3. BASE BID "B" – GENERAL CONSTRUCTION WORK

\$ _____

Total price to provide and install labor and material for the general construction work portion of the project as shown on the Drawings, and as specified herein.

4. BID BOND—Check box at right for compliance with the Bid Bond requirement.

☐

5. ADDENDA—Indicate receipt, by number, of all Addenda issued for this work.

6. Estimated date of substantial completion:
(Refer to "Instructions to Contractors", Article 20)

(month/day/year)

7. Project Contingency/Change Order Price Allowance
(Check box at right to acknowledge the inclusion of the contingency Price Allowance, as per "Instructions to Contractors", Article 35)

☐

9. TOTAL AMOUNT ACCEPTED BY OWNER

(To be filled in by Owner)

SIGNED:

ACCEPTED:

ADAMS COUNTY BOARD

NAME OF FIRM

STREET ADDRESS

CITY, STATE

AUTHORIZED SIGNATURE

BY _____

TITLE _____

INSTRUCTIONS TO CONTRACTORS

1. PURPOSE OF THIS SECTION OF SPECIFICATIONS

It is the intent of this section of these specifications to make known to interested contractors any special instructions which may affect their bids or their work on this Project, and to state herein such instructions of special nature that are not included in the specifications sections dealing in actual construction work.

2. GENERAL COMPOSITION OF THESE SPECIFICATIONS

In some instances, part of these specifications contain instructions pertaining to work that is actually not required for this particular construction project. Inasmuch as many of the parts contained herein are pre-prepared for use as specification material for almost any type construction project, the Contractors are herewith instructed to disregard such parts not actually pertaining to this particular project.

3. OWNER

The "Owner" is: ADAMS COUNTY BOARD
QUINCY, ADAMS COUNTY, ILLINOIS
(Also referred to as "Using Agency")

4. PROJECT

The "Project" is: ELEVATOR MODERNIZATION FOR:
ADAMS COUNTY COURTHOUSE

5. BIDS REQUESTED

Bids for construction of the Project will be received in two (2) Base Bid Categories and one (1) Alternate Bid Category as follows:

BASE BID "A" – ELEVATOR MODERNIZATION

To include all of the work stated in the Advertisement for Bids, Instructions to Contractors, General Conditions, Project Drawings, and all of the work specified herein for the Elevator Modernization.

ALTERNATE BID "A-1" – PROPRIETARY CONTROLLERS / EQUIPMENT

To include all of the work stated in the Advertisement for Bids, Instructions to Contractors, General Conditions, Project Drawings, and all of the work specified herein to provide proprietary elevator equipment in lieu of non-proprietary.

BASE BID "B" – GENERAL CONSTRUCTION WORK

To include all of the work stated in the Advertisement for Bids, Instructions to Contractors, General Conditions, Project Drawings, and all of the work specified herein for the General Construction work.

Under these bid categories, and as a requirement of this work, the Bidder is required to visit and inspect the existing conditions at the site. He is to satisfy himself of the existing conditions and required work under this bid category, and a bid submitted shall reflect all work required to result in a complete and thorough installation, of the new work, including all manufacturers warranty periods.

Any and all clarification documents or other backup documentation necessary to accompany the bids shall be attached to, and included, with the Bid.

The Instructions to Contractors and the General Conditions sections of the Project Specifications are applicable to, and are a part of the requirements under each phase of the work. The Bids can be awarded in any combination and/or any order of priority. Base Bids or combinations of bids the Owner selects for award. Individual Alternate bids are tied to the respective Bid Categories. NOTE: Where referenced, the "Prime Contractor" is the "General Contractor".

6. PREPARATION OF PROPOSAL

Proposals shall be made on the form provided by the Architect. Forms are included in the Specifications and Proposal Forms shall become a part of the Contract Documents.

No Bid or Proposal submitted will be considered by the Owner unless costs are listed on all Base and Alternate Bids.

No Bid or Proposal submitted will be considered by the Owner unless such Bid or Proposal is accompanied by a Certified Check, Cashier's Check, or a Surety Guarantee Bond made payable to:

Adams County Board
Quincy, Illinois

in an amount equal to at least five percent (5%) of the amount of the Bid or Proposal being submitted.

Said deposit to accompany Bid or Proposal shall be forfeited to the Owner in the event that any Contractor to whom a Contract is awarded fails to enter into Contract with the Owner for the work proposed in his Bid or Proposal. This deposit will be held by the Owner until project has achieved substantial completion status.

The proposal guarantee will be returned as soon as practicable to those Contractors who, at the discretion of the Owner and the Architect, would not be considered in making the award.

7. DELIVERY OF PROPOSAL/RECEIPT OF BIDS

Proposals shall be addressed to the Architect and shall be delivered in an opaque envelope addressed as indicated below, marked PROPOSAL, and bearing the title of the work and the name of the bidder.

If sent by mail, preferably registered, the sealed Proposal marked as indicated above should be enclosed in an additional envelope, addressed as follows:

Adams County Board
521 Vermont Street
Quincy, Illinois 62301

RE: ELEVATOR MODERNIZATION FOR:
ADAMS COUNTY COURTHOUSE
QUINCY, ILLINOIS

If delivered in person, refer to time, place, and location listed in the Advertisement for Bids.

8. PERFORMANCE AND LABOR/MATERIAL PAYMENT BONDS

The successful bidder, to whom a Contract is awarded, shall be required to provide the Owner, within a period of fourteen (14) days following the date of the notice of such award, a Surety Company's Performance Bond and a Labor/Material Payment Bond, each in an amount equal to one hundred percent (100%) of the Contract Amount.

The Surety Company must have a Policy Holder's rating of "A" or better, and a Financial Rating of Class XII, or higher in the A.M. Best Company's "KEY RATING GUIDE", and the form used will be acceptable to the Owner. The cost of such bonds shall be included in the Contractor's Proposal.

9. CONTRACT AWARD

An award, if made, will be made to the lowest responsible bidder complying with the terms of the Contract within a period of Sixty (60) days following the bid due date; during this period, the Owner shall have the right to retain all Bids, Bid Deposits received during bidding, and no bid or Bid Deposit may be withdrawn and will remain in full force and effect for such period. The Owner reserves the right to waive informalities in a bid or failure to comply with all of the requirements of these instructions, and to award the work to other than the lowest bidder.

10. NOTICE TO PROCEED

The successful bidder, if awarded the Contract, shall commence the work within ten (10) calendar days after the date of receipt of official notice to proceed.

11. EXAMINATION OF SITE

The Contractor shall carefully examine the site and scope of work. No pleas of ignorance of conditions that exist or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work as a result of failure to make a proper examination and investigation will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all of the requirements of the Specifications and Drawing or will be accepted as a basis for any claims whatsoever for extra compensation.

12. FAMILIARIZATION WITH THE WORK

Before submitting his bid, the Contractor shall familiarize himself with the work, rules governing acceptance of his work, site where the work is performed, labor conditions, the conditions and facilities at the site for delivery and installation, all laws, regulations and other factors affecting performance of the work. The prospective bidder shall carefully correlate his observations with the requirements of the bidding documents and contract drawings, and otherwise satisfy himself of the expense and difficulties attending performance of the work, including delivery of material and equipment. The submission of a bid will constitute an incontrovertible representation by the bidder that he has complied with every requirement of this Article.

13. SPECIFIED MATERIALS AND EQUIPMENT

- a) No alterations or changes in the Plans, Specifications, or other instructions enclosed shall be permitted.
- b) Any prospective bidder who discovers ambiguities or is in doubt as to the true meaning of any part of the Bid Documents shall promptly request Architect for an interpretation thereof. Requests may not be honored if received less than (5) five business days prior to the date of receipt of bids.
- c) Interpretations will be made only by Addenda, duly issued and copies of each Addendum will be mailed or delivered to each Bid Document holder of record.
- d) The bidder shall be solely responsible for any interpretation of the drawings and specifications other than by duly issued Addenda.
- e) Except such materials as definitely specified to be furnished by the Owner, the Contractor shall provide all materials, tools, automotive, and other construction equipment which may be necessary for the completion of the work described in the specifications. He shall keep a competent representative on the job and employ men skilled in the various phases of the work involved. All work shall be performed in a workmanlike manner.
- f) Products and manufacturers not named or specified herein may be included upon request in writing to the Architect at least seven (7) days prior to receipt of bids. Products and manufacturers not specifically named or specified in the Drawings, Specifications, or Addenda will not be considered for use on this Project.

14. FAILURE TO EXECUTE CONTRACT

Failure to comply with any of the requirements of these Specifications to execute contract within ten (10) days after mailing as specified, or to furnish security as required shall be just cause for the annulment of the award. In the event of such annulment of the award, the amount of the proposal guarantee shall become the property of the Owner, not as a penalty, but as liquidated damages. Award may then be made to the next best qualified bidder, or the work re-advertised, or handled as the Owner may elect.

15. ACCESS, STORAGE, ETC. ON SITE

The contractor shall have access during normal working hours to that portion of site on which construction is involved. On-site storage of materials, equipment, etc. shall be as prearranged with Owner.

16. "GENERAL CONDITIONS" NOT APPLICABLE

The "General Conditions" section of this specification is a standard form and, therefore, certain paragraphs are not applicable to this Project. Therefore, the following paragraphs shall hereby be deleted from the requirements of this specification.

- a. Paragraph 10 - BUILDING PERMITS
- b. Paragraph 18-HEATING DURING CONSTRUCTION
- c. Paragraph 26-WATER SNOW AND ICE REMOVAL
- d. Paragraph 28-APPLICABLE TAXES
- e. Paragraph 33-CONSTRUCTION LIGHT AND POWER
- f. Paragraph 34-WATER DURING CONSTRUCTION
- g. Paragraph 35-JOB SUPERINTENDENT, FOREMAN
- h. Paragraph 36 - OFFICE AT SITE
- i. Paragraph 40 - LEAD BASED PAINT

17. PROTECTION OF BUILDING, SITE AND ADJOINING PROPERTIES

The Contractor shall be required to take the necessary precautionary measures to insure the protection of the building, site and adjoining properties from damage of any kind resulting from work on this Project. All costs of such precautionary measures, as well as the costs incurred in repair or replacement of damage inflicted, will be borne by the Contractor as part of his work on this Project.

18. TAX EXEMPT

All contractors are hereby notified that this Project is exempt for Sales Tax on all materials. Bids shall, therefore, not include such tax.

19. PROGRESS OF WORK

It is the intent of this specification to require aggressive progress to completion once the Project is started. Final and total completion for Base Bids "A" and "B" shall be on or before April 15, 2021.

20. SUBSTANTIAL COMPLETION

Substantial completion is a condition which occurs when the Owner accepts the certification of the Architect that construction is sufficiently complete in accordance with the contract documents so that the Project or a designated portion thereof may be occupied for the use intended. Substantial completion shall be as indicated in the Contractor Proposal Form and as accepted by the Owner.

21. WAGES PAID TO LABORERS ON PROJECT

Contractor shall verify with the Owner, the wages paid to laborers on this Project.

22. CONTRACT LIMIT LINES

The contract limit lines have been established so that the contractor's activities, access, materials, and equipment have a limited area within to operate. Contract limit lines shall constitute the immediately adjacent areas of the work to take place, and only the Owners property. Verify with the Architect.

23. ON-SITE EXISTING TOILET FACILITIES

The Base Bid General Contractor (s) shall be allowed to use existing toilet facilities in the building, but abuse of such facilities shall result in the revocation of such privileges.

24. UTILITIES, WATER, ELECTRIC DURING CONSTRUCTION

The contractor shall arrange for any and all water, electric, and utilities required at the site to perform his work successfully. Utilities of any kind should be available at the site.

25. INSURANCE REQUIREMENTS

Proof of insurance, as listed in "General Conditions", shall be sent to the architect upon receipt of "Notice of Award".

26. LIEN WAIVERS SUBMITTED WITH EACH PAY REQUEST

Contractors shall submit Partial Lien Waivers with every progressive (monthly) pay request, and shall submit Final Lien waivers in accordance with the General Conditions included herein.

27. RUBBISH REMOVAL

The contractor shall be responsible for removal of rubbish, etc. from the site, and shall provide an on-site container or dumpster, if required, for said rubbish. Location of dumpster shall be approved by Owner.

28. ADD TO PARA 11
INSURANCE OF THE GENERAL CONDITIONS SECTION

An Umbrella, of Excess Liability, policy of not less than \$1,000,000. for any one occurrence and subject to the same aggregate over the Comprehensive Automobile Liability Employee's Liability, Comprehensive General Liability, shall be required.

The Contractor shall list as "Additional Insured" on his certificate and in addition to the Owner (Adams County Highway Department), and the following: Architechnics, INC. This should include all employees, officers, and directors of the listed entities.

29. SHOP DRAWING SUBMITTAL REQUIREMENT ALERT

Certain sections of the specifications clearly indicate that preparation and submittal of detailed shop and equipment drawings are required before the contractor may proceed with the work. NO exception to this rule will be permitted on this project.

30. REMOVAL

The contractor shall accept the premises as he finds them upon the signing of the contract. He shall completely remove the existing work so indicated on the drawings, and/or as specified and as may be required to permit the proper installation of new work. All items removed and not reused shall be deposited in an E.P.A. approved landfill.

31. EXISTING CONDITIONS

Bidders shall carefully check the drawings and compare with existing conditions to ascertain the full amount of work involved. The contractor will be required to execute all labor and provide all material to carry out all the work required to obtain the results as indicated on the drawings and in the specifications, whether each and every item is mentioned or not. No additional compensation will be allowed for such work or materials as are not shown on the drawings and/or specified but which are required to obtain the above mentioned results.

32. PRE-CONSTRUCTION MEETING

After low bidders are identified and contracts are awarded, a Pre-Construction Meeting will be scheduled at the site to coordinate efforts of all contractors, subcontractors, and Owners personnel.

33. CONTRACTOR (BIDDER) SHALL PROVIDE LIST OF ALL SUBCONTRACTORS TO BE USED ON THIS PROJECT

The successful contractor, to whom a contract is awarded for this work, will be required to provide to the Owner, for his review, consideration, and approval, a list of subcontractors to be used on this Project.

34. EXISTING BUILDING AND GROUNDS, SHALL BE RESTORED FOLLOWING CONSTRUCTION ACTIVITIES

This contractor shall completely restore any surfaces, areas, or items damaged because of construction or improvement activities. Upon completion of this Project, all surfaces, areas and items to remain at the site shall be completely functional and operational, in top quality condition. The contractor shall bear all costs of restoration as part of this construction.

35. CHANGE ORDER / CONTINGENCY PRICE ALLOWANCE

The General Contractor for both Base Bids shall provide a Change Order Allowance in his Bids to cover any unanticipated modifications to the Contract that result in price, or cost additions. The allowance should be equal to the following:

Base Bid "A" – Ten Thousand Dollars (\$10,000.00)

Base Bid "B" – Two Thousand Dollars (\$2,000.00)

If total Contract Change Orders, in addition to Contract, results in a total dollar amount greater than this Allowance, then the balance will be added to the Contract at the end of the Project.

If total Contract Change Orders, In addition to Contract, results in a total dollar amount less than the Allowance, then the balance will be credited to the Contract (deducted from the Contract) at the end of the Project.

This allowance shall be included in the Contractor's Base Bid as indicated and acknowledge as such on the Bid Form. This Contingency Allowance shall be included in the Contractor's bid(s), as requested on the Contractor Proposal Form (Bid Form). Failure to acknowledge inclusion of this Contingency Allowance(s) shall justify the rejection of a bid or bids.

36. CALCULATIONS FOR QUANTITIES OF MATERIALS

The Contractor shall employ, at his own expense, include in his Bid, and be totally responsible for all costs related to the calculation of quantities of materials for this Project.

QUANTITIES ARE NOT PROVIDED AS PART OF THESE PLANS AND SPECIFICATIONS FOR THIS PROJECT

37. SHORING

- A. All temporary shoring, bracing, etc. required for the installation of new work, shall be included in this contract. This must be done to the entire satisfaction of the Architect, but the Contractor must assume full responsibility for the work. The Contractor shall make good, at not cost to the Owner, any damage caused by improper support or failure of shoring in any respect.
- B. When permanent supports are completed, the Contractor shall remove all shoring, temporary bracing, and similar elements.

38. CONTRACTOR COORDINATE INSTALLATION OF EQUIPMENT AND OTHER CONSTRUCTION TO BE INSTALLED BY OTHERS

All Base Bid Contractor shall coordinate any items of construction and/or installation of equipment that is not included in their contract Scope of Work, and/or will be provided and installed by the Owner, or by others. Each Contractor shall accommodate the other contractor and consider this part of their responsibilities. The Base Bid (Building Construction) General Contractors shall also accommodate this to the extent of all specialized equipment suppliers/installers for the new building construction.

39. ARCHITECT NOT RESPONSIBLE FOR EXISTING CONDITIONS

Architechnics, Inc. cannot assume responsibility or liability of any of the existing construction.

Many decisions concerning the new construction for this Project used the existing Plans and Specifications for the existing building as a basis for the new work. Much of this work is covered up or concealed behind existing construction, and is not available for verification. Only at the time of actual construction/demolition work will many of these conditions be verified.

Because of the complexity and detailed nature of the new work and remodeling work, and the reliability of existing infrastructure to actually be in place as it is presented to be, the Architect cannot assume operating and functioning condition of the various existing systems, infrastructure, and existing equipment.

40. EXISTING FACILITY TO BE SECURED DURING CONSTRUCTION

The Existing Facility shall be secured by the Contractor during the entire construction period. Contractors shall accommodate this, to an extent, as much as possible. If certain items related to the new construction, or any of the construction activity, will affect the security of the existing facilities, the contractor shall notify an Owner's representative or the Architect as early as possible before the affected point in time the interruption will occur.

Phasing of the Project shall be addressed, and will be discussed at the Pre-Construction Meeting. Generally, Construction Phasing should be clarified before the Contractor begins work at the Site. The Contractor's Schedule shall be submitted to the Architect and Owner for prior approval.

41. BURIED UTILITIES AND / OR SERVICES

Particular note should be taken by the DEMOLITION Contractor as to the existence of buried utilities and/or services.

Contractor shall take care in removing existing electrical, lighting, and plumbing elements that are to be relocated and/or reused.

42. PROJECT SUBSTANTIAL COMPLETION DATE (STARTING DATE)

Prior to submitting his bid, the Base Bid Contractor(s) shall satisfy himself that the project can be substantially completed within the time frame herewith listed, and shall positively respond to anticipated substantial completion date on the Contractor Proposal Form.

The bidder shall prepare his bid to allow for this time critical construction period, and so that he has sufficient funds to facilitate any and all resources necessary to meet or exceed the substantial completion date. The response to this item on the bid form is essential and shall represent sufficient grounds to justify contract award for this project. The successful bidder will be required to provide guarantees prior to contract award, in the form of a negotiated agreement at the pre contract award/pre-construction meeting.

43. ASSIGNMENT OF PROJECT COORDINATION

The project coordination will be the responsibility of the Base Bid Building Construction General Contractor and shall be scheduled to accommodate construction coordination with the Owner.

44. OCCUPANCY DURING CONSTRUCTION

In general, occupancy of the existing building by staff, employees, and the public shall continue during construction period. Contractor shall confine his work to a limited area of the site; all as prearranged and approved with the Owner, and with their knowledge.

Electric, Plumbing, or Mechanical service disruption to any area of the building shall be restricted to a minimal time period and as prearranged with each area occupant, and the Owner.

Special provisions shall be prearranged with Owner and Architect so that work shall be confined so as not to disrupt the facility. The Owner shall notify the contractor of any scheduled events or special dates that would affect the work. Scheduling shall be discussed at the Pre-Construction Conference.

45. EXISTING FACILITY TO REMAIN IN USE DURING CONSTRUCTION

The Existing Facility will remain in use during the entire construction period. Contractors shall accommodate this, to an extent, as much as possible. If certain items related to the new construction, or any of the construction activity, will affect the operation of the existing facilities, the contractor shall notify an Owner's representative or the Architect as early as possible before the affected point in time the interruption will occur.

Phasing of the Project is addressed in this specification section, and will be discussed at the Pre-Construction Meeting. Generally, Construction Phasing should be clarified before the Contractor begins work at the Site. The Contractor's Schedule shall be submitted to the Architect and Owner for prior approval.

Certain work by Contractor shall be performed in off-business hours, holidays, or special times, as required to work at the project at times or in areas that do not affect the Owner's business operations.

46. ASBESTOS ALERT

This Contractor should encounter no asbestos, or asbestos products related with work on this project.

If asbestos materials are encountered, the Architect shall be notified immediately and a licensed Asbestos Contractor shall be engaged to complete asbestos abatement procedures. The Owner will contract separately with the Asbestos Contractor.

47. OWNER'S DESIGNATED ON-SITE PERSONNEL

The Owner's designated on-site personnel for contact and verification of items pertaining to the Site, Building and Grounds is: Mr. Terry Bower, 217-242-4111.

48. CONSTRUCTION PROGRESS MEETINGS

Progress meetings for this project shall be held every two weeks. A schedule shall be provided by the Architect after the bids are awarded.

49. LIQUIDATED DAMAGES

Since the Contract Time Period is reasonable, and since the Owner could suffer damage, based on hazardous pedestrian conditions, related to an over extended construction period; the project should be substantially completed within the Substantial Completion Time, as stated above. Liquidated damages for noncompliance with the stated Completion Time shall be as follows:

Five Hundred Dollars (\$500.00) per day, each consecutive calendar day beyond the specified substantial completion date.

GENERAL CONDITIONS

1. "PROJECT" DEFINED

The word "Project" shall be held to mean the work required and as illustrated by means of the various Contract Documents prepared by the Architect.

2. "CONTRACT DOCUMENTS" DEFINED

The term "Contract Documents" shall be held to mean the various materials prepared by the Architect to illustrate and set forth the requirements of this Project and shall include Advertisement for Bids, Instructions to Contractors, General Conditions, Specifications, Drawings, Addenda, and Change Orders. The Contract Documents will be the basis on which all bids, or proposals, shall be made and no bid or proposal will be entertained by the Owner unless based on the Contract Documents.

3. "OWNER" DEFINED

The word "Owner" shall be held to mean the person or persons named in the Contract Documents.

4. "ARCHITECT" DEFINED

The term "Architect" shall be held to mean ARCHITECHNICS, INC., 510 Maine Street, Quincy, Illinois.

5. "CONTRACTOR, SUB-CONTRACTOR" DEFINED

The word "Contractor" shall be held to mean a person or persons contracting directly with the Owner for work in connection with construction of the Project. A "subcontractor" is held to mean a person, or persons, engaged by a Contractor to perform work on the Project through the means of an Agreement directly with such Contractor, and not with the Owner himself. The single masculine gender is used herein in reference to the term "Contractor" to denote any, or all contractors performing work in connection with this Project; also, any reference to "Contractor" implies the inclusion of all his subcontractors (if any) as well.

Where specific reference to a Contractor is made by the words, "Building Contractor", "Plumbing Contractor", "Mechanical Contractor", "Electrical Contractor", it shall refer to the Contractor's work as outlined in the Index of the Specifications.

6. "CONTRACT" DEFINED

The word "Contract" shall be held to mean the Agreement between the Owner and a Contractor providing for the latter's work in connection with the construction of the Project. Such Agreement will take into account and be based on the Contract Documents.

7. BIDS OR PROPOSALS

All Bids or Proposals made to the Owner for the construction of this Project shall be made in duplicate on the forms provided by the Architect. All information requested on the form shall be fully completed by the Contractor.

The fact that a Contractor submits a Bid or Proposal to the Owner shall be held to indicate that such Contractor agrees to perform the work on the Project in full accord with the Contract Documents.

8. OWNER'S RIGHT RESERVED

It is to be understood that the Owner reserves the right to reject any or all Bids or Proposals received, and the right to award a contract to other than the lowest bidder.

9. MODIFICATIONS, CHANGES

The Owner has the right to alter, modify, or otherwise change in any way any portion of or any material used on this project in any manner that the Owner may find advisable to do so. In such event, the Contract shall in no case be invalidated or voided by such changing of the work, but rather will be merely adjusted in amount to reflect the changes made. The cost of such changes will appear and, in such instances, shall be fairly determined in a manner agreed upon, such as: (a) by the Contractor; (b) by computation using the unit prices quoted in Contractor's Bid or Proposal, or as named in Contract; (c) by Contractor's actual cost, plus an agreed-upon amount to provide for his overhead and profit.

No change in any material or alteration of design will be performed by the Contractor without first securing a written Change Order, duly signed by the Owner. No claim for extra work performed will be allowed unless substantiated by such signed Change Order.

10. BUILDING PERMITS, PUBLIC ORDINANCES, INSPECTIONS

If a Building Permit is required for this Project, it shall be the duty of the Owner to provide it before actual work is commenced on the building site.

The Contractor shall be held liable for any and all violations of Public Ordinances arising from his work on this Project, and he shall hold the Owner harmless from any and all actions that may arise as a result of such violations.

The Contractor shall be required to arrange and pay for all such inspections that may be required by Public Ordinances, and all such costs incurred are to be included in the amount of the Contractor's Bid or Proposal.

11. INSURANCE CARRIED BY THE CONTRACTOR

The Contractor will be required to provide and maintain, in effect for the term of the Project, the following insurance policies with the minimum limits as indicated:

Comprehensive Automobile Liability - including; (a) Owned Vehicles, (b) Non-Owned Vehicles; (c) Hired Vehicles: \$500,000 Combined Single Limit.

Comprehensive General Liability - including; (a) Premises-Operations, (b) Contractual ("Hold Harmless" Agreement), (c) Independent Contractors, (d) products, (e) XCU.

Workmen's Compensation, Including Occupational Disease - Limits: (Statutory)

Employer's Liability - \$500,000

Owner's Protection - including Bodily Injury limits of \$1,000,000 Combined Single Limit. The Protective Liability policy shall name the Owner as the insured and shall also include the Architect as an additional insured.

Umbrella or Excess of Loss Coverage - If the limits specified above are not met, and Umbrella or Excess Liability policy of not less than \$1,000,000 for any one occurrence and subject to the same aggregate over the Comprehensive Automobile Liability, Comprehensive General Liability, Employer's Liability, and Owner's Protective Liability coverages is acceptable.

(*Bodily Injury includes Accidental Death)

Prior to commencing actual work on the Project, the Owner will be furnished with a signed Certificate of Insurance showing coverage for this project in the name of the Contractor for the required insurance. Ten (10) days written notice will be provided the Owner by the carrier prior to any change, expiration, or cancellation of the required coverage.

12. INSURANCE CARRIED BY THE OWNER

The Owner shall secure and pay for a FIRE, EXTENDED COVERAGE, VANDALISM AND MALICIOUS MISCHIEF INSURANCE Policy for this Project, placing such policy in force as soon as there is an insurable interest in the Project. This Policy shall be written on what is termed a "Builder's Risk, Completed Value" form, and shall provide coverage for all labor and material intended for use on this Project that are either already installed to place or in storage on the job site or its environs. The policy shall be written in an amount equal to 100% of the total sum of all contracts and coverage shall include, but not be limited to, Fire and Extended Coverage and Vandalism and Malicious Mischief. The policy shall be in the name of the Owner and the Contractor, as their respective interests may appear.

13. INDEMNIFICATION

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses from and against all claims, damages, losses and expenses including, but not limited to, attorneys' fees arising out of, or resulting from, the performance of the work, provided that any such claim, damage loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to, or destruction of, tangible property (other than the work itself) including the loss of use resulting therefrom, and (b) is caused in whole, or in part, by any negligent act or omission of the Contractor, any subcontractor, anyone directly, or indirectly, employed by any of them or anyone whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which could otherwise exist as to any party or person described in this Paragraph 13.

In any and all claims against the Owner or the Architect, or any of their agents or employees by any employee of the Contractor, or any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under workmen compensation acts, disability benefit acts or other employee benefit acts.

The obligations of the Contractor under this paragraph shall not extend to the liability of the Architect, his agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications; or (b) the giving of, or the failure to give directions or instructions, by the Architect, his agents or employees provided such giving, or failure to give, is the primary cause of the injury or damage.

14. SCHEDULE OF VALUES

Prior to the first payment request, the Contractor will submit to the Architect a schedule of values of the main branches of the work, totaling the amount of the Contract. Each item in the schedule will include its proper share of overhead and profit. This schedule, when approved by the Architect, shall be used only as a basis for the Contractor's request for Progress Payments.

15. PAYMENTS TO CONTRACTORS

Progress Payments to the Contractor during construction will be made by the Owner on a monthly basis, following application by the Contractor and when certified by the Architect as herein provided for. Such requests will be made to the Architect in duplicate on the AIA Document G702 forms. The application shall indicate the individual item and amount for which payment is requested by means of the above Schedule of Values.

Applications are to be made for 90% of the value of materials, equipment, supplies, labor, and services actually incorporated in the work or materials, equipment, and supplies suitably stored at the site or, when due to lack of adequate suitable on-site storage facilities, stored in designated acceptable off-site locations for which the Contractor must provide adequate insurance to protect the Owner's interest therein.

The Architect will determine the amount to be properly due and will issue a Certificate of Payment to the Owner with copy to the Contractor; no payments will be made without such certification from the Architect.

No Certificate for progress payment, nor any progress payment, nor any partial or entire uses or occupancy of the Project by the Owner, shall constitute an acceptance of any work which is not in accordance with the Contract Documents or which may require correction for Final Acceptance by the Architect.

The 10% retained from each Progress Payment shall be withheld until satisfactory completion and Final Acceptance, at which time it is due and payable to the Contractor.

16. PAYMENTS BY CONTRACTOR, RELEASE OF CLAIMS

No materials or equipment for the Project shall be supplied by any Contractor or subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. It is expected that the Contractor make periodic payments to subcontractors and all other suppliers of material and labor for which he himself requests Progress Payments, and furthermore, shall warrant that he has good title to all materials and supplies for which he accepts partial payment.

At any time during the progress of the work, the Owner shall have the right to request Waivers of Lien from the Contractors and his subcontractors and all other suppliers of materials and labor for which the Contractor has accepted partial payment.

The Final Payment shall not become due until the Contractor shall deliver to the Owner a complete release of all claims against the Owner, which may arise as a result of the Contractor's work on the Project, including claims of all subcontractors and all others who may have provided materials, equipment, supplies, labor, or services to the Project.

17. FINAL ACCEPTANCE AND GUARANTEE OF WORK

Final acceptance of the Project by the Owner will not be made until all items on the Architects "Punch List" are completed in a satisfactory manner acceptable to the Owner and the Architect. At this time, the Architect's certificate recommending Final Payment to the Contractor will be delivered to the Owner and is then due and payable.

Final acceptance of the work of the Contractor and final payment made to the Contractor will not relieve that Contractor of the responsibility of correcting faulty workmanship and materials or equipment found to be defective within a period of one year following date of the Architect's certificate recommending Final Payment to the Contractor.

All equipment and accessories shall be guaranteed for a period of twelve months after date of final acceptance against all defects in materials and workmanship, and that such equipment will produce the specified and required results. All such defective equipment found during the guarantee period will be removed and replaced at no additional cost.

18. HEATING DURING CONSTRUCTION

Unless otherwise stated, construction of the Project will continue to progress and not be shut down by cold or other inclement weather. Before the Project is enclosed as defined herein, each Contractor or Sub-contractor will be required to provide temporary coverings, enclosures, or other precautionary measures, including heating, to protect his work from the weather. The Project, or significant portion thereof, shall be considered to be "enclosed" when (1) the roof is on and watertight; (2) the exterior walls have been completed, or at least sufficiently completed, to enable any remaining openings to be closed with suitable temporary closures. After enclosure, as described above, heating for construction will be provided in accord with Fig. 1, Chart Showing the Division of Responsibility Among Contractors and subcontractors in Providing Heat for Construction Within Enclosed Project, and also as further required below.

All temporary enclosures will be subject to the approval of the Architect and will be in place when heat is required. The Architect shall be notified, in writing, at least twenty-one (21) days in advance, and shall approve of the intended steps to be taken to provide heating for construction. Temporary heating will not be of electric resistance type and will be subject to the Architect's approval. Such equipment shall not deposit soot, smudge, or other film or layer of unwanted material on walls, ceilings, floors, or other surfaces. Should such deposits result, they shall be removed at no expense to the Owner. Temporary equipment shall be vented to the outside, if necessary, to prevent the products of combustion from being discharged within, and adequate ventilation will be provided to prevent the accumulation of harmful gases in the heated working spaces. Fans shall be provided when necessary to provide for circulation to insure against isolated hot or cold spots, so as to result in a uniform effect for the proper drying or curing of all work throughout. The following minimum temperatures shall be achieved: 65 degrees F for painting, finish flooring, and mill work; 55 Degrees F for plastering; 45 Degrees F at all times.

Mechanical, electrical, and other connections made to heating equipment will be of suitable materials, protected, when necessary, from possible damage by construction operation. Entire system must be safe and reliable, and not prejudice the Owner's Fire Insurance for the Project. If unreliability is experienced with the system, or if necessary for other precautionary reasons, night watchman service will be provided as necessary to fully insure safety and uninterrupted heating.

If the permanent equipment has been used to provide heat for construction, the Mechanical Contractor or subcontractor will completely clean and recondition the equipment prior to Final Acceptance. All filters used shall be replaced, strainers cleaned, and valve seats and diaphragms checked and placed in first-class working order. All warranties and guarantees shall commence at Final Acceptance and the Owner will thereupon assume all expense of operating and maintaining the permanent equipment.

Permanent equipment will not be used for cooling purposes during construction.

19. PROTECTION OF STORED MATERIALS

The Contractor will be required to take precautionary measures to safeguard stored materials from damage from any cause whatsoever, but especially as the result of weather and construction operation. Materials will be supported above ground, padded or blocked apart to prevent contact, covered or enclosed, or otherwise protected to insure against damage as may be required or when instructed by the Architect.

20. REPAIR OF DAMAGED WORK

The Contractor will be required to take precautionary measures to protect the work against damage of any sort. When it becomes necessary to repair or replace damaged work, the Contractor shall make such repair or replacement. The Contractor who inflicts damage on his own work shall repair or replace such work, but in the event that the Contractor inflicts damage to the work of any other, the Contractor causing said damage to the work will assume the costs of repair or replacement of the inflicting damage to the work of the other. If the responsibility for inflicting damage cannot be agreed to, the costs of repair or replacement will be borne by the Contractors working on the Project at the time the damage was found to have been inflicted, but in no case, shall the Owner be required to pay for repair or replacement of damage to work that is inflicted by the Contractor.

21. PROTECTION OF SITE AND ADJOINING PROPERTIES

The Contractor shall be required to take the necessary precautionary measures to insure the protection of the building site and the adjoining properties from damage of any kind, resulting from work on this Project. All costs of such precautionary measures, as well as the costs incurred in repair or replacement of damage inflicted, will be borne by the Contractor as a part of his work on this Project.

22. SAFETY PRECAUTIONS

The Contractor shall take all reasonable precautions to provide for the safety of his personnel while engaged in the work of this Project, and for the safety of all other persons who may be affected by construction operations at the Project site.

The Contractor will determine and comply with all applicable laws, ordinances, rules, regulations and orders of any public authority having jurisdiction for the safety of persons or property, or to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and users or adjacent utilities.

To the above end, the Contractor shall institute and carry out a safety program for the prevention of accidents during the course of his work on this Project.

23. CONSTRUCTION PROCEDURES, ETC.

The Contractor shall be responsible for establishing construction procedures, and he will devise and employ suitable means, methods, and construction techniques as may be required or necessary to safely and effectively accomplish his work on this Project. He will be solely responsible for the safety of ladders, stages, scaffolds, runways, planks, and other work platforms of portable nature or constructed to facilitate the performance of his work. He shall not permit such work facilities to be excessively loaded with materials and equipment or otherwise overloaded so as to endanger the safety of such facilities. The Contractor will be responsible for the safety of temporary shoring, bracing, underpinning, forming, and all other such procedures which he may be required to employ in the performance of his work on the Project. The Contractor shall not load or permit any part of the Project itself to be loaded so as to endanger its safety; and he shall take special precautions to prevent overloading floors and roofs due to excessive weights of stored materials.

24. CONSTRUCTION REVIEW BY THE ARCHITECT

The Architect shall have access at any time to the Project site in order that he can periodically review the work of the Contractor to determine, in general, if the Project is proceeding in accord with the Contract Documents. The Architect is not obligated to make exhaustive or continuous on-site inspections, and he will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions in connection with the work. During the period of actual construction, the Architect's obligation to the Owner is to see that the result of the Contractor's work brings about a Project that complies with the Contract Documents.

25. CORRECTION OF FAULTY WORK

The Contractor will promptly correct all work rejected by the Architect as defective or failing to conform to the Contract Documents, whether observed before or after substantial completion, and whether or not fabricated, installed, or completed. The Contractor shall bear all costs of correcting such faulty work.

26. WATER, SNOW AND ICE REMOVAL

The Contractor shall prevent the accumulation of water, snow, or ice that might interfere with the conduct of this work on the Project and shall remove same whenever required, or as directed by the Architect. The costs of so doing shall be borne by the Contractor or as part of his work on this Project.

27. REMOVAL OF RUBBISH

The Project shall be kept free from undue accumulation of rubbish and debris resulting from construction and shall be maintained in an orderly, reasonably clean condition and appearance at all times. The Contractor will be required to move from the jobsite all such rubbish and debris, resulting from his work on this Project, as a part of his work on the Project.

Upon completion of the work, the Project will be left in an absolutely clean condition, to the satisfaction of the Owner and the Architect.

28. APPLICABLE TAXES

The Bid or Proposal made to the Owner by a Contractor shall include the amounts of all applicable taxes imposed by Municipal, State, or Federal Governments.

29. PROGRESS OF WORK

It is the intent of these specifications to require that the construction work on this Project be pursued by the Contractor without unnecessary lag or delay and, to this end, it shall be required that full-time, full-scale operations be maintained at all times.

30. PRODUCTS AND MANUFACTURERS NOT NAMED

Products and manufacturers not named or specified herein may be considered upon request in writing to the Architect at least seven (7) days prior to receipt of Bids. Products and manufacturers not specifically named, or specified by Addenda will not be considered for use on this Project.

31. CONFLICTING INFORMATION INSTRUCTION

Wherever, on the accompanying Architect's drawings, conflicting information is found to exist between scale and dimension, drawing and wording, etc., the following rules will apply:

- a) Printed dimensions will take preference over scaled dimensions on all drawings and details.
- b) Scaled details are to take preference over conflicting information contained on general drawings, such as floor plans.
- c) Large scale details will take preference over conflicting information indicated on smaller scaled details.
- d) Printed notations and other descriptive writing will take preference over conflicting information indicated by drawings.

32. COOPERATION ON PROJECT

All Contractors, subcontractors, and their employees will be required to cooperate, each with all others, to insure an orderly progress of the Project and to make certain beforehand that the work of each trade will correlate and fit with that of others. Each trade is, therefore, instructed to install its own work in full knowledge of all others affected, in order that such work fits and relates to the whole in the manner intended.

No trade shall assume the right to cover-up or pass-by correlated work required of another, nor shall any trade preempt space and convenient locations for its own work without regard to the others. It is to be clearly understood that work already installed by one trade that is found to conflict with or prevent the installations of others will be required to be changed to accommodate the remaining installations.

33. CONSTRUCTION LIGHT AND POWER

The Electrical Contractor shall, as a part of his work on this Project, provide and maintain a 120/208V or 120/240V, 1 phase, 60 Hz temporary electric service for construction light and power, consisting of (a) 20A lighting circuits, (b) 20A, 120V "GFCI" protected receptacle circuits, and (c) 20A power circuits installed on each level of building construction.

Lighting circuits shall consist of 100W incandescent weatherproof lamp sockets, located at sufficient intervals and locations to provide the minimum levels of illumination, as required by applicable regulations, codes, or ordinances.

Receptacle circuits shall consist of grounding type duplex receptacles installed at maximum 50' intervals, 5000 s.f. per receptacle, with a maximum of six (6) receptacles per circuit.

Power circuits shall consist of combination 120/240V or 120/208V grounding type receptacles installed at a minimum of one (1) per level or maximum 100' intervals, 10,000 s.f. per receptacle, with maximum of four (4) receptacles per circuit.

The maximum size motor to be used by any contractor shall be limited to 1 HP.

The Building Construction Contractor, or General Contractor, shall furnish, install and maintain minimum incandescent lamps for all lamp sockets described above. All Contractors or subcontractors shall provide their own extension cords as they may require.

Any Contractor or subcontractor requiring service characteristics, capacity, quantity, location, or higher levels of illumination, other than described above, shall provide such service, lamps, and additional equipment at his own expense.

Electrical energy used during construction shall be furnished by the Owner.

34. WATER DURING CONSTRUCTION

Unless already available on the site, the Plumbing Contractor or subcontractor will be required to provide a metered 1" IPS temporary cold water supply at convenient location for the use of all contractors and subcontractors for purposes of construction until such time as water can be supplied through the permanent piping system. Supply shall terminate above ground, convenient for use, and equipped with a valved, hose-end type connection. Measures shall be provided to prevent freezing. Each Contractor and subcontractor will provide, protect, and maintain hoses as may be required for his own use.

The Owner will pay for all water used for construction purposes at the site.

35. JOB SUPERINTENDENT, FOREMAN

The Building Construction Contractor, or General Contractor, shall employ a competent Job Superintendent to have charge of his work on the Project whenever the Building Construction Contract exceeds \$100,000, or a General Contract exceeds \$150,000; such employee to be in full-time attendance at the site during the entire progress of the work. For projects of lesser amount, an experienced Journeyman Foreman may be in charge.

Contractors and subcontractors for Plumbing, Mechanical and electrical work shall employ at least an experienced Journeyman Foreman to be in charge of their work on the Project.

Superintendent and Foremen are to be designated by their employer to the Architect, along with a resume of experience and other supportive information, if requested. The Superintendent shall represent the Contractor and all communications given to the Superintendent shall be as binding as if given to the Contractor.

36. OFFICE AT SITE

Unless otherwise stated, the Building Construction Contractor, or General Contractor, will be required to provide and maintain a suitable field office at the site from the time work is started until the Project is completed. Such office shall be provided with heat, electric, lighting, and a job telephone. The cost of heating the office and the telephone service will be borne by the responsible Contractor.

One copy of the Architect's plans, specifications, and other Project Documents, as well as approved manufacturer's shop drawings, must be kept on file in the office for reference use by the Architect. Office furnishings may be as required or desired by the Contractor, but must at least contain a large plan table for drawing reference use.

37. AMERICANS WITH DISABILITIES ACT (A.D.A.)

Pro-One Design, Inc., to the best of its ability, has exercised professional efforts to interpret the intent of the "Americans with Disabilities Act" (A.D.A.), and other applicable Federal, State and Local Codes and requirements. Architechnics, Inc. cannot guarantee total compliance with any work directly related to the A.D.A., when the Owner performs and/or authorizes work using these documents and/or drawings.

38. CONSTRUCTION ACCESS, NEW, EXISTING OPENINGS, CLOSURE OF OPENINGS

Contractor, for the Base Bid Category shall provide required openings for all Contractors, in existing masonry, concrete, wood, and/or other walls and floors for either access to concealed wiring, devices, piping, etc. or for installation of new construction; including floor and wall openings for individual runs of piping or conduit, plumbing fixture openings, and/or mechanical system openings, unless otherwise indicated on the drawings and/or specifications. If not covered or addressed on the drawings or specifications, this Article applies.

Contractor for Base Bid Category work shall provide required openings in roof for new construction, devices, or equipment.

Contractor for Base Bid Category work shall close all abandoned floor, wall, and roof openings resulting from remodeling or new construction work performed by all contractors.

39. ASBESTOS ALERT

This Contractor should encounter no asbestos, or asbestos products related with work on this project.

If asbestos materials are encountered, the Architect shall be notified immediately and a licensed Asbestos Contractor shall be engaged to complete asbestos abatement procedures. The Owner may contract separately with the Asbestos Contractor.

40. LEAD BASED PAINT INSPECTION, TESTING, AND ABATEMENT

Lead Based paint inspection, testing, and abatement has not been performed on this project site. The Contractor and Owner shall determine if lead-based paint inspection, testing, and abatement is required on this project. The inspection shall be performed by a certified Industrial Hygienist and an Illinois Department of Public Health licensed Lead Inspector/Risk Assessor, following the protocol outlined in the 1997 Chapter 7 revision of the HUD guidelines for Evaluation of Lead-Based Paint, June 1995.

A copy of the findings should be disclosed and/or made available for review by all occupants of the space (pre-construction, and post-construction). The complete report must also be provided to new purchasers and it must be made available to new tenants. Landlords, Owners, (lessors) and Sellers are also required to distribute an educational pamphlet and include standard warning language in their leases, sales contracts, or posted for construction activity to ensure that information for protection from lead-based paint hazards are available.

If necessary, the Contractor and Owner should also establish a site specific operations and maintenance (O & M) program to address procedures for dealing with LBP and lead hazards that may be impacted by construction, maintenance, and custodial staff on a regular basis, during routine operations, or at a one-time event.

Architechnics, Inc. cannot assume responsibility or liability of any of the existing construction, including the existence of lead-based paint in or on the Owner's property.

Architechnics, Inc. cannot assume any responsibility or be held liable for the claims, reports, or content of any lead-based paint inspection, testing and abatement at this project site.

41. OPERATION AND MAINTENANCE DATA

To aid the continued instruction of operating and maintenance personnel, and to provide a positive source of information regarding the products incorporated into the Work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.

Provide front and back covers for each Manual, using durable material approved by the Architect, and clearly identified on or through the cover with at least the following information:

- a. Complete nomenclature of all parts of all equipment.
- b. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
- c. Copy of all guarantees and warranties issued.
- d. Manufacturers' bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
- e. Such other data as required in pertinent Sections of these Specifications.

This Section contemplates written, descriptive, narrative to completely describe the operating and maintenance instructions for all equipment and systems provided for this Contract.

Accumulation and binding of shop drawings, catalog cuts, manufacturer's literature, etc. will be required.

67. EQUAL EMPLOYMENT OPPORTUNITY

67.1 Compliance with the Illinois Human Rights Act:

During the performance of this contract, the Contractor shall comply in all respects with the Illinois Human Rights Act cited in Article 39 of the General Conditions and the Illinois Department of Human Rights' Rules and Regulations for Public Contracts including, but not limited to the following provisions:

- A. Affirmative Action and Nondiscrimination: The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, ancestry, age, marital status, physical or mental handicap unrelated to ability, or unfavorable discharge from the military service (excluding dishonorable). The Contractor shall examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.
- B. Recruiting and Hiring: The Contractor, when hiring additional employees in order to perform this contract or any portion thereof, will determine the availability, in accordance with the Illinois Department of Human Rights' Rules and Regulations for Public Contracts, of minorities and women in the localities from which they may reasonably be recruited and will hire for each job classification for which employees are being hired in such a way that minorities and women are not underutilized.
- C. Employment Advertisements: The Contractor, in all solicitations or advertisements for employees, will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, national origin, ancestry, age, marital status, physical or mental handicap unrelated to ability, or unfavorable discharge from military service (excluding dishonorable).
- D. Notification of Labor Organizations: The Contractor will send to each labor organization or representative of workers with which the Contractor has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the Contractor's obligation under the Illinois Human Rights Act and the Illinois Department of Human Rights' Rules and Regulations for Public Contracts. If any such labor organization or representative fails or refuses to cooperate with the Contractor's efforts to comply with such act, rules, and regulations, the Contractor will promptly notify said department and the Owner. The Contractor will recruit employees from other sources, when necessary, to comply with the Act.

E. Manpower Utilization Reports: The Contractor will submit all reports required by the Illinois Department of Human Rights' Rules and Regulations for Public Contracts and shall furnish all relevant information as may from time to time be requested by the Department or the Owner.

F. Accessibility of Employment Records: The Contractor will permit access to all relevant books, records, and accounts and work sites by personnel of the Owner and the Illinois Department of Human Rights for the purpose of investigation to ascertain compliance with the Illinois Human Rights Act and Department's Rules and Regulations for Public Contracts.

G. Subcontract Requirements: The Contractor shall include verbatim or by reference the provisions of this article and the equal employment opportunity clause set forth in Section 6.1 of the Illinois Department of Human Rights' Rules and Regulations for Public Contracts as a material term in every subcontract and purchase order, so that such provisions will be binding upon every such Subcontractor or supplier.

67.2 Compliance with Federal Requirements: The Contractor shall comply with all provisions of federal Executive Orders 11246 (dated September 24, 1965) and 11375 (dated October 17, 1967), as amended, and shall comply with the rules, regulations and relevant orders of the U.S. Secretary of Labor, including the following:

- A. The Contractor and all Subcontractors employed by the Contractor in connection with the contract shall develop and implement a written affirmative action plan which complies with all State and Federal laws and regulations.
- B. The Contractor shall not discriminate against any employee or applicant for employment who is a disabled or a Viet Nam era veteran, in addition to those listed in paragraph 67.1A.

67.3 Responsibility for Subcontractors' Compliance: The Contractor shall be responsible for compliance with applicable provisions of this article by all Subcontractors employed by the Contractor in connection with this contract and will promptly notify both the Owner and Illinois Department of Human Rights in the event any Subcontractor fails or refuses to comply therewith. In addition, the Contractor will not utilize any Subcontractor declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of the political subdivisions or municipal corporations.

67.4 Penalties for Noncompliance: In the event of the Contractor's noncompliance with any provision of this Equal Employment Opportunity article, the Illinois Human Rights and Regulations for Public Contracts of the federal requirements listed in paragraph 67.2 of this article, the Contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations. In addition, this contract may be cancelled or voided in whole or in part and such other sanctions, penalties, or remedies may be imposed as provided by statute or regulation.

PREVAILING WAGE RATES

All contractors involved with this project are responsible for maintaining the current prevailing wage rates in the county where the work is being performed, and following all the requirements and regulations of the State of Illinois.

The current prevailing wage rates can be found here:
<http://www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx>

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA & SAMPLES

1. GENERAL

1.01 GENERAL

- A. Each Contractor make specified pre-construction submittals in accordance with Article 01340 of the Standard Documents for Construction.

1.02 SUBMITTALS

- A. Contractor and Sub-Contractor :
 - 1. Submit in accordance with individual Specification Sections.

END OF SECTION

SECTION 01530

BARRIERS

1. GENERAL

1.01 REQUIREMENTS INCLUDE

A. Prime Contractor:

1. Provide and maintain suitable barriers to prevent unauthorized entry, and to protect the work, existing facilities and construction operations.
2. Remove when no longer needed, at completion of the work or as directed.

2. PRODUCTS

2.01 MATERIALS: Materials may be new or used, suitable for purpose. Comply with specified codes.

2.02 BARRIERS: Materials, at Contractors option, appropriate for purpose.

3. EXECUTION

3.01 INSTALLATION

- A. Install facilities of a neat and uniform appearance.
- B. Maintain barriers during entire construction period.
- C. Relocate barriers as construction progresses.

3.02 REMOVAL

- A. Remove when authorized by the A/E.

END 01530

SECTION 01540

SECURITY

1. GENERAL

1.01 REQUIREMENTS INCLUDE

A. General Contractor:

1. Protect work, stored materials, and construction equipment from theft and vandalism.
2. Protect premises from entry by unauthorized persons.
3. Protect Owner's operations at site from theft, vandalism, or damage from Contractor's work or employees.
4. Cooperate with the supplemental security program, of the Owner.

1.02 RELATED REQUIREMENTS

A. Specified elsewhere:

1. 01530 - Barriers.
2. 01620 - Storage & Protection.

1.03 MAINTENANCE AND SECURITY

- A. Maintain security program throughout construction period until Owner occupancy precludes need for Contractor security.
- B. The Contractor for each Base Bid is responsible for the storage and security of their own work and equipment. The Owner may provide storage areas within the existing building.

END 01540.

SECTION 01561
CONSTRUCTION CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Each Contractor provide cleaning and disposal of waste materials, debris and rubbish during construction.
- B. General Contractor: Supervise and coordinate cleaning operations of all Assigned Contractors.

1.02 RELATED REQUIREMENTS

- A. Specified elsewhere:
 - 1. 01710 – Final Cleaning

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Provide covered containers for deposit of waste materials debris, and rubbish.
- B. Control cleaning operations so that dust and other particles will not adhere to wet or newly coated surfaces.

3.02 DISPOSAL

- A. Regularly remove waste materials, debris, and rubbish from site weekly and dispose of off-site.

END

SECTION 01620

STORAGE & PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Each Contractor:
 - 1. Make arrangements with Owner's Representative for storage of materials and equipment to be installed in project. Protection and security for stored materials and equipment, on and off site is solely contractor's responsibility.

1.02 RELATED REQUIREMENTS

- A. Specified elsewhere
 - 1. 01340 - Shop Drawings, Product Data & Samples
 - 2. 01710 - Cleaning.

1.03 OFF-SITE AUTHORIZATION

- A. Payment for materials/equipment stored off-site storage will be permitted only on prior written authorization in accord with the General Conditions.

PART 2 PRODUCTS

2.01 PROTECTIVE MATERIALS

- A. For duration of storage period, provide materials which will provide proper protection against the elements or other harmful environmental condition.

PART 3 EXECUTION

3.01 LOCATION

- A. Where shown on drawings or where authorized by Owner.
- B. Architect/Engineer will resolve conflicts in storage requirements of all contractors.

END 01620

SECTION 01630

SUBSTITUTIONS & PRODUCT OPTIONS

1. GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Base all bids on providing all products exactly as specified.
- B. For products specified only by reference or performance standards, select any product which meets or exceeds standards, by any manufacturers, subject to the Architect/Engineer's approval.
- C. For products specified by naming several products or manufacturers, select any product and manufacturer named. Only those products or manufacturer named shall be considered acceptable.

1.02 SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS

- A. **PRIOR TO BID OPENING:** The Architect/Engineer will consider written requests to amend the bidding documents to add products not specified provided such requests are received at least 7 calendar days prior to bid opening date. Requests received after that time will not be considered. When a request is approved, the Architect/Engineer will issue an appropriate addendum not less than seven calendar days prior to bid opening date.
- B. **AFTER AWARD OF CONTRACT:** No substitutions will be considered after Notice of Award except under one or more of the following conditions:
 - 1. Substitutions required for compliance with final interpretations of code requirements or insurance regulations.
 - 2. Unavailability of specified products, through no fault of Contractor.
 - 3. Subsequent information discloses inability of specified product to perform properly or to fit in designated space.
 - 4. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as specified.
 - 5. When a substitution would be substantially to Owner's best interests.

1.03 SUBSTITUTION REQUIREMENTS

- A. Submit (2) copies of each request for substitution. Include in request:
 - 1. Complete data substantiating compliance of proposed substitution with contract documents.
 - 2. For products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature:
 - 1. Product description.
 - 2. Performance and test data.
 - 3. Reference standards.
 - c. Samples

- d. Name and address of similar projects on which product was used and date of installation.
 3. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 4. Itemized comparison of proposed substitution with product or method specified.
 5. Data relating to changes in construction schedule.
 6. Identify:
 - a. Changes or coordination required.
 - b. Other contract affected.
 7. Accurate cost data on proposed substitution in comparison with product or method specified.
- B. In making request for substitution, bidder/contractor represents:
 1. It will provide the same guarantee for substitution as for product or method specified.
 2. It will coordinate installation of accepted substitutions into work, making all changes for work to be complete in all respects.
 3. Cost data is complete and includes all related costs under its contract, but excludes:
 - a. Architect/Engineer's redesign.
 - b. Administrative costs of Architect/Engineer.
 4. It will pay all additional costs and expenses for Owner, Architect/Engineer, and other contractors.
- C. Substitutions will not be considered when:
 1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with Paragraph 1.03.
 2. Acceptance will require substantial revision of contract document.

END

SECTION 01700

CONTRACT CLOSEOUT

1.01 DESCRIPTION: Provide an orderly and efficient transfer of the completed work to the Owner.

A. Related Work:

1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and other Sections in Division 1 of these Specifications.
2. Activities relative to Contract closeout are described in the General Conditions.
3. "Substantial Completion" is defined in the General Conditions.

1.02 QUALITY ASSURANCE: Prior to requesting inspection by the Architect, use adequate means to assure that the work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.03 PROCEDURES: The following procedures will be used to achieve Contract Closeout:

A. Substantial Completion:

1. Prepare and submit the list required by the General Conditions, Para. 17.
2. Within a reasonable time after receipt of the list, the Architect will inspect to determine status of completion.
3. Should the Architect determine that the Work is not substantially complete:
 - a. The Architect promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. Remedy the deficiencies and notify the Architect when ready for reinspection.
 - c. The Architect will reinspect the Work.
4. When the Architect concurs that the work is substantially complete:
 - a. The Architect will prepare a "Punch List", accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect.
 - b. The Architect will submit the Certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

B. Final Completion:

1. Prepare and submit the notice required by the General Conditions.
2. Verify that the work is complete including, but not necessarily limited to, the items mentioned in the General Conditions.
3. Certify that:
 - a. Contract Documents have been reviewed.
 - b. Work has been inspected for compliance with the Contract Documents.

- c. Work has been completed in accordance with the Contract Documents.
- d. Equipment and systems have been tested as required, and are operational.
- e. Work is completed and ready for final inspection.
- 4. The Architect will make an inspection to verify status of completion.
- 5. Should the Architect determine that the work is incomplete or defective:
 - a. The Architect will promptly so notify the Contractor, in writing, listing the incomplete or defective work.
 - b. Remedy the deficiencies promptly, and notify the Architect when ready for reinspection.
- 6. When the Architect determines that the work is acceptable under the Contract Documents, he will request the contractor to make closeout submittals.

C. Closeout submittals include, but are not necessarily limited to:

- 1. Materials extra stock.
- 2. Evidence of payment and release of liens.
- 3. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
- 4. List of manufacturer's recommendation for regular cleaning of all finishes on the building, equipment and furnishings.

D. Final adjustment of accounts:

- 1. Submit a final statement of accounting to the Architect, showing all adjustments to the Contract Sum.
- 2. If so required, the Architect will prepare a final Change Order showing adjustments to the Contract Sum which were not made previously by Change Orders.

1.04 INSPECTION: Instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the work.

1.05 GUARANTEE: Contractor(s) shall provide an unlimited guarantee covering materials and workmanship for a period of one year from the Date of Substantial Completion.

- A. Additional requirements are listed in other Sections of these Specifications with respect to specific products or materials listed in those Sections.
 - 1. Provide fully executed copies of manufacturer's warranties as a part of the work of this Section.

END

SECTION 01710

CLEANING

1.01 DESCRIPTION: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

A. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and other Sections in Division 1 of these Specifications.
2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE: Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

- A.** In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

1.03 CLEANING MATERIALS AND EQUIPMENT: Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

1.04 COMPATIBILITY: Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

1.05 PROGRESS CLEANING: Perform periodic cleaning to comply with this Section.

A. General:

1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic; or drainage, and providing required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
 - a. "Clean," for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

1.06 FINAL CLEANING: Prior to final acceptance, additional cleaning must be accomplished.

- A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.
- B. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 1.05 above.
- C. Schedule final cleaning as approved by the Architect to enable the Owner to accept a completely clean work.

1.07 CLEANING DURING OWNER'S OCCUPANCY: Should the Owner occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect in accordance with the General Conditions of the Contract.

END

SECTION 02223

MINOR DEMOLITION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work contemplated under this Section consists of the furnishing of all labor, materials, equipment and services required for all minor demolition as indicated on the accompanying working drawings or as specified herein.
- B. The following items are listed as a guide in determining the Project requirements, but not necessarily limited to the following:
 - 1. Removal of designated construction.
 - 2. Disposal of materials.
 - 3. Identification of utilities.
 - 4. Refer to items as indicated on drawings.

1.02 SPECIAL INSTRUCTIONS, NOT CONTAINED HEREIN

- A. This contractor is referred to "Instructions to Contractors" for complete information regarding any special instructions affecting his bid or his work on this project.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Obtain required permits from authorities.
- C. Do not close or obstruct egress from any building exit.
- D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.
- E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.04 SCHEDULING

- A. Schedule work to coincide with new construction.
- B. Describe demolition removal procedures and schedule.

1.05 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide, erect and maintain weatherproof closures for exterior openings.
- B. Erect and maintain weatherproof closures for exterior openings.
- C. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued building occupancy.
- D. Protect existing materials and equipment that are not to be demolished.
- E. Prevent movement of structure; provide bracing and shoring.
- F. Notify affected utility companies before starting work and comply with their requirements.
- G. Mark location and termination of utilities.
- H. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

- A. Disconnect, cap, and identify designated utilities within demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing supporting structural members.
- C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- D. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.
- E. Remove temporary facilities.

END

SECTION 14210

ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes one (1) existing overhead electric traction elevator and the completed alteration/modernization as specified.
- B. Related Sections include the following:
 - 1. Electrical: The Base Bid "B" Electrical Contractor shall complete the requirements for electrical service for elevators to and including fused disconnect switches as specified. Provide code required electrical alterations for car lighting, GFCI work outlets, machine room lighting, pit lighting, and any new conduit, wiring, relays, and/or reprogramming of alarm panels required fire initiating devices.
 - 2. Interim Maintenance: See 1.09.B for maintenance requirements of the remaining operational elevator following mobilization.

1.02 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory condition.
- B. AHJ: Division of Elevator Safety, State of Illinois.
- C. Substantial Completion: The date that the elevator is completed and restored to public service.
- D. COP: Car Operating Panel.
- E. CDI: Car Direction Indicator
- F. MCP: Maintenance Control Program

1.03 SUBMITTALS

- A. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of machines, controllers, governors, controllers, rope brake, signals, and any other such equipment. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- B. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch-(75-mm-) square samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.
- C. Provide submittals in accordance with Section 01340.

- D. Manufacturer/Installer Certificates: Signed by elevator manufacturer/installer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, including emergency generator if provided, as shown and specified, are adequate for elevator system being provided.
 - E. Contractor Licenses: The Elevator Contractor shall be prepared to show proof of licensing for the company and any personnel working on the project.
 - F. MCP: At the time of Substantial Completion, submit a Maintenance Control Program to the Consultant for approval. A copy of the program shall be kept within the machine room.
 - G. Maintenance (Owner's) Manuals: Provided three (3) operations and maintenance instruction manuals complete with parts listing with sources indicated; recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel including any and all inputs as well as outputs which are to be included on the "as-built" drawings.
 - 1. At the time of Substantial Completion, submit one copy of the Owner's Manual for approval by the Elevator Consultant. Following approval by the Consultant provide the remaining two manuals to the Owner.
 - H. Inspections, Acceptance Tests, Certificates, Operating Permits, Annual Tests:
 - 1. Apply and pay for all new Alteration/Installation Permits.
 - a. Upon receipt, provide a copy of Installation Permits to the Owner and Consultant.
 - b. Upon project mobilization, post original or copy of Installation Permits in elevator machine room spaces.
 - 2. The Elevator Contractor shall make application and pay for any temporary operating permits and inspections unless required by others.
 - 3. Pay for the initial operating permits for all vertical transportation equipment specified.
 - 4. Coordinate and pay for all final third party elevator inspections.
 - 5. Perform Code required Annual Tests on all vertical transportation equipment during the 12th month of warranty.
 - 6. Do not call for an Acceptance Inspection until all of the "life safety" issues and code requirements have been installed and tested in advance. Firefighter's Service recall via initiating device shall be operational at the time of Acceptance.
- 1.04 QUALITY ASSURANCE
- A. Installer Qualifications: Elevator manufacturer or an experienced installer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of 10 years minimum successful service and installation performance with Illinois.
 - B. Regulatory Requirements: In addition to local governing Building Codes and regulations, comply with applicable provisions in ASME A17.1-2013 editions including adopted supplements or newly adopted versions, "Safety Code for Elevators and Escalators", ASME A17.5—Electrical Equipment for Elevators and Escalators, NEII-1-2000, "Building Transportation Standards and Guidelines, current adopted edition of the NEC, "National Electrical Code."
 - C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." Section 407 in ICC AI 17.1. It is understood that the area of each elevator will not be altered either by a decrease or increase in existing size.

1.05 COORDINATION

- A. Coordinate locations and dimensions of other work relating to electric traction elevators including electrical service, electrical outlets, lights, switches in pits, machine rooms, and conductors from the fire control panel to the elevator equipment rooms.
- B. The public elevator within the common elevator shaft shall remain in service while the jail elevator is being renovated.

1.06 OTHER WORK

- A. Wiring: The Base Bid "B" Electrical Contractor's work includes but is not limited to relocation of disconnect switches, car light disconnect switches, GFCI outlets at various locations, pit lighting, machine room lighting, and smoke detector and conduit if needed.
 - 1. Smoke Detectors: Test all smoke detectors upon completion of the elevator. Reprogram the fire alarm panel as needed to cause of flashing hat signal to the elevator when the machine room detector has been activated. Provide any/all wiring, conduit, relays, and reprogramming as may be required. Coordinate all work with the Owner's fire alarm system provider.
 - 2. The existing elevator is not currently wired for emergency power.
 - 3. Move each main line disconnect switch to any location that provides the required 36" clearance. Show locations on machine room layout drawing which shall also show the location of the new controllers.
 - 4. Provide adequate lighting within the machine room. Provide no less than 200 lx across the floor area. See the Drawings for light fixtures required.
 - 5. Provide a suitable "ground" wiring throughout the elevator electrical system including main lines.
 - 6. Provide adequate lighting and switches located within each of the pit areas. Provide no less than 100 lx across the entire pit floor. Pit light switches can be wired individually.

1.07 WARRANTY

- A. Special Manufacturer's/Installer's Warranty: Written warranty, signed by manufacturer/installer agreeing to repair, restore, or replace defective elevator work as provided by the General Conditions and specifications.
 - 1. Warranty Period: Twelve (12) months from date of Substantial Completion.

1.08 MAINTENANCE/SERVICE DURING WARRANTY

- A. Initial Maintenance/Service: Beginning at Substantial Completion of both elevators, in addition to the interim period where only one elevator is complete, provide twelve (12) months of what is commonly referred to in the elevator industry as full maintenance service, utilizing skilled, licensed employees of the elevator Installer. Include monthly preventive maintenance examinations, common repairs and/or typical replacement of worn or defective components. Provide routine lubrication, cleaning, testing of equipment and devices, and adjusting as required for proper elevator operation. Provide parts and supplies as used in the manufacture and installation of original equipment.
 - 1. A service/maintenance employee check-in procedure shall be established prior to the Substantial Completion. The Elevator Contractor's representatives shall be required to sign in and out whenever they are on location for the purpose of service, maintenance, repair, inspection, and/or testing of the equipment.

2. Perform routine maintenance during normal working hours unless otherwise required by the Owner. Should the Owner make a special request for emergency services caused by entrapments or special ADA usage needs, the Elevator Contractor shall include the straight portion of any billing that might be necessary and only invoice the "bonus" portion of the hourly rate. Callbacks made necessary as a result of vandalism or other causes beyond the control of the Contractor shall be billed at the Contractor's regular rates.
 3. Response times listed below shall be adhered to at all times.
 - a. Routine Call-Backs: Response time four (4) hours or less. These callbacks shall be of a non-emergency nature.
 - 1) Immediately upon receiving a request for service the Elevator Contractor shall provide an Estimated Time of Arrival (ETA) to the Owner.
 4. In no instance shall the routine maintenance procedures be delivered less than one time per month. The Elevator Contractor shall maintain a log within each elevator machine room. All service examinations, callbacks, repairs, replacements, Fire Service tests, and safety tests shall be recorded. The log shall legibly indicate the date, time, type of work and the individual performing the work. At the end of the warranty period give this log to the Owner whereby a copy can be made for the Contractor's use if desired.
 5. The Elevator Contractor shall be required to perform an Annual Test on each elevator during the 12th (final) month of the warranty. Test shall be witnessed and third party inspections shall be provided by an inspection company of the Owner's choosing. The Elevator Contractor shall pay for the inspection company. All tests results shall be recorded in the machine room log. Send the completed testing forms to the AHJ and Owner as may be required.
- B. Interim Maintenance Requirements: The Elevator Contractor shall assume maintenance responsibilities of the second duplex elevator beginning the date of project mobilization or any prior agreed upon date. Periodic maintenance and callback service shall be provided during alteration of the first elevator.

PART 2 - PRODUCTS

2.01 MANUFACTURERS/INSTALLERS

- A. Manufacturers/Installers: Subject to compliance with requirements, provide electric traction elevators and alterations as specified by one of the following:
1. KONE Elevators, Springfield, Illinois, www.kone.com 217-544-5461
 2. Otis Elevator Co, Springfield, Illinois, www.otis.com 217-544-4633
 3. ThyssenKrupp Elevator, Peoria Illinois, www.thyssenkruppelevator.com 309-691-2596
 4. Barnard Elevator, Quincy, Illinois, www.barnardelevator.com 217-222-6396
 5. Schumacher Elevator, Denver, IA, www.schumacherelevator.com 319-984-5676

2.02 MATERIALS AND COMPONENTS

- A. General: Provide generic, nonproprietary, standard and conventional type overhead traction elevator systems unless otherwise pre-approved. Where components are not specifically indicated, provide nonproprietary standard components.
1. Alternate Bid "A-1" will allow the use of proprietary systems.
- B. Machines/Motors: Existing machine to be reused; existing motor to be removed and replaced.
1. Provide manufacturer's standard motor assembly appropriate to the existing elevator cab weights and number of stops. Provide and install all cables and belts, and make all connections as required for a complete and total installation.

2. Drain, flush, and clean gear case on existing elevator drive machines. Add all new high quality gear lubrication as recommend by the machine manufacturer.
 3. Provide sheave/cable guards as required by Code on both drive machines.
 4. If necessary, alter machine height to account for unintended movement device clearance needs.
- C. Hoist Cables:
1. Remove and replace existing hoist cables. Adjust tension and clean as needed.
 - a. Provide anti-rotation means at each cable end.
 - b. Provide tags as required by Code.
- D. Door Operators: Provide one (1) door operator system.
1. Solid State operators systems shall be mounted on header and supports.
 2. Provide detachable hanger tracks, door hanger, and hanger rollers.
 3. Provide gate switch and door restrictor.
 4. Provide new clutch and/or pickup device mounted to the car door.
 5. Provide all hardware and material to complete the installation.
 6. Fully adjust all operators system for a smooth and quite operation upon completion.
- E. Hoistway Door Systems: Provide one (1) complete hoistway door package.
1. Furnish and install hoistway hanger tracks, detachable hangers with rollers on each elevator entrance.
 2. Furnish and install hoistway door interlocks, "real" type spring loaded closures, and relating cables on each elevator entrance.
 3. Replace door guides as needed at each individual lobby entrance.
 4. Provide new door "retainers" as the bottom of each door panel.
- F. Hoistway Switches: Furnish and install all new hoistway switches, vanes, cams, brackets, and hardware on each elevator. Use soft rollers to reduce noise levels when elevators approach terminal landings.
- G. Speed Governors: Remove and replace with new.
1. Test governor in both directions of travel.
 2. Seal all adjustments following testing.
- H. Car Safety: Existing car safety equipment shall be removed and replaced as required.
1. Clean, lubricate, adjust, and test each car safety device.
 2. Affix proper testing tags after testing.
- I. Unintended Movement Devices: Each elevator shall be equipped with an unintended movement device as prescribed by A17.1. Devices shall be located in the machine room space and shall not require the need of air-compressors.
1. Basis of Design: Hollister-Whitney Rope Gripper
 2. Unintended movement devices shall be located, secured, fastened, and tested in accordance with the manufacturer's requirements.
- J. Roller Guides: All existing roller guide assemblies may be reused in accordance with the following:
1. Existing car roller guide wheel shall be replaced.
 2. Existing car roller guide assembly shall be adjusted for proper clearance and a smooth and

- quiet operation.
 - 3. Existing counterweight roller guide wheel shall be replaced.
 - 4. Existing counterweight guide assembly shall be adjusted for proper clearance and a smooth and quiet operation.
- K. Guide Rails: Reuse existing. Check all car and counterweight guides for plumbness to 1/32". Align and file all rail joints as needed in order to provide a smooth and quite ride.
- L. Car Frames and Platforms: Reuse existing.
 - 1. Provide new aprons (toe guards) of the required length at each of two (2) car door entrances as required, verify at project site.
 - 2. Check each car frame for alignment and balance.
 - 3. Tighten all car and counterweight frame bolts.
- M. Pit Equipment:
 - 1. Replace Emergency Stop pit switch. Locate new switch adjacent to pit entry door. Locate easily identifiable switch so as to be convenient and accessible from the lower floor level.
 - 2. Reuse existing buffers provided they are suitable for use and any change in clearances as may result by adding the new car safety device.
 - 3. Reuse all counterweight guards.
- N. Wiring:
 - 1. Furnish and install all new car, machine room, hoistway, and fixture wiring. Furnish and install all new traveling cables with a suitable number of conductors for communications and cameras for in-car surveillance.
 - 2. Where appropriate, existing conduit and duct may be reused provided they meet or exceed NEC standards and requirements as published in the latest edition.
 - 3. Coordinate the wiring of smoke detectors and associated relay modules to be provided by Owner's vendor. Provide information to other disciplines as to the required signal needs of the elevator controller.

2.03 OPERATION SYSTEMS

- A. Traction Type Passenger Elevators: Provide nonproprietary microprocessor control system unless otherwise approved. Each traction elevator control shall be equipped with an AC closed loop configuration with Flux Vector drive. Controller systems shall not require special hand held tools or laptop computer systems to adjust or make program changes unless the Elevator Contractor intends to leave that device on site at completion.
 - 1. Two Car Group—Provide "selective collective automatic operation" as defined in A17.1.
 - 2. Products: Subject to compliance with the above written requirements, provide one of the following control systems.
 - a. Elevator Controls Inc. Sacramento
 - b. Galaxy by GAL
 - c. MCE
 - d. Smartrise
 - e. Equal as approved by Architect.
 - 3. Spare Parts: Spare parts shall be available for purchase or stocking at the building location. No exchange only policy or provision shall limit any parts purchase. No building owner approval shall be required for processing any parts order.
 - 4. Factory Training: Factory and/or onsite training shall be available from the original controller manufacturer. Training shall be extended to Owner's maintenance staff in regards to installation, adjustment, maintenance and troubleshooting of the controller equipment. Fees shall be published and reasonable.

- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:

1. Independent Service: Key/rocker switch in car control service cabinet shall remove a car from simplex operation and allow it to respond only to car calls. When on Independent Service, doors close only in response to the door close button.
2. Hoistway Access: Elevator shall all be equipped with Hoistway Access. A fixture shall be located at each terminal landing allowing up and down movement of an elevator with the hoistway and car door in the open position. Movement shall be restricted by switches and cams located on the elevator and in the hoistway. Use tamperproof screws to secure the cover.
 - a. Each switch shall have an up, down, and neutral position. The key shall be removable in the neutral position only.
 - b. Each switch shall make use of a Best Lock system. The elevator contractor shall supply cores.
 - c. An activation rocker or key switch shall be located within a service cabinet located in the Car Operating Panel.

- C. Security Features: In addition to the above operational features, provide an Emergency Stop switch to be located within the Service Cabinet. Security features shall not affect emergency firefighters' service.

- D. Cameras: To be supplied and installed by Owner's security system provider. Coordinate all required wiring and controls.

2.04 SIGNAL EQUIPMENT

- A. General: Provide vandal resistant signal equipment for elevator with hall-call and car-call LED illuminated buttons when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic. All signal fixture cover plates shall utilize stainless steel with a #4 satin finish. All equipment shall make of the proper Braille indications.

- B. Indicator Lights: All indicator lights shall make use of long-lasting LED bulbs.

- C. Car Operation Panels—COP: Provide fully recessed car control stations with metal faceplates. Mount in return panel adjacent to car door, if not otherwise indicated.

1. Include call buttons for each landing served, door open and close buttons, alarms, emergency stop switch, fire service devices, audible signals, and any other buttons, switches, and controls required for specified car operation.
2. Reuse existing floor identification nomenclature. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
3. The COP shall have the elevator number engraved in the cover plate. Use "EAST JAIL ELEVATOR". Provide the appropriate Braille symbol next to each floor number.
4. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."
5. Provide a single (1) Car Operating Panel.
6. Provide the appropriate three position switch for Fire Service. Include audible and visual signals. Use only FEO-KI key switch. Locate all Fire Service operations behind a locked panel as required by A 17.1-2010 or latest adopted Code edition. Provide firefighter's service instructions on the inside of each compartment cover.
7. Provide a battery operated emergency light in the elevator.
8. The COP shall all have a lockable Service Cabinet located within the panel. The following functions shall be secured within the cabinet.

- a. Independent Service rocker switch.
 - b. Hoistway Access enable rocker or keyed switch.
 - c. Car light rocker switch.
 - d. Two speed fan rocker switch.
 - e. Two gang, 110 VAC, GFI work outlet.
 - f. Emergency Stop
 - g. Emergency Light test switch.
 - D. Car Position Indicators: Provide a digital-display type car position indicator to be located in the upper end of the COP.
 - 1. Remove all remnants of the existing transom mounted position indicators and provide material to cover the entire void left from the old PI. Use tamper proof screws to secure.
 - E. Hall Push-Button Stations: All new VANDAL RESISTANT at each landing.
 - 1. Slim-line surface mount fixture units shall be acceptable. Remove and cover the original box locations currently hidden by a cover plate.
 - 2. Provide units with direction-indicating buttons, two buttons at intermediate landings, one button at terminal landings. Use only LED indicator bulbs.
 - 3. Provide FEO-K1 key switch at designated landing.
 - 4. Provide a "Priority" return key switch at the designated landing.
 - 5. Locate an engraved or etched Appendix O sign in all lobby pushbutton fixture covers.
 - 6. Provide an LED indicator light in one main lobby fixture that illuminates each time the elevator system goes on Fire Service either via key switch activation or fire initiating device.
 - 7. Hoistway Access key switches can be provided within the lobby pushbutton panel or within a separate and new recessed fixture located near the entrance.
 - G. Hall Position Indicators: All floors
 - 1. The existing position indicator boxes mount above the door frame shall be removed and new digital position indicators with a direction arrow and floor indicator provided. Where existing openings are not of a size and shape required for a new fixture, the Contractor shall carefully enlarge the opening as needed.
 - 2. The Contractor will patch and paint these areas as required.
 - 3. Provide #4 satin stainless steel covers at each lobby position indicator.
 - H. Car Direction Indicators: Reuse or replace the existing lobby CDI's should it be impossible to integrate the device into the new control system. Each elevator shall have direction indicators at each entrance using LED light sources.
 - 1. If new units are provided, they shall not extend any further out from the wall than the existing. Otherwise fixtures shall be recessed.
 - I. Hoistway Access: Lobby keyed switches at terminal landings.
 - 1. Provide all new hoistway access switches at each terminal landing.
 - 2. At the option of the Elevator Contractor, Hoistway Access switches can be provided in the terminal pushbutton fixtures.
 - J. Hoistway Access (Manual): For emergency hoistway access, locate a hole in each fast speed hoistway door panel at each hoistway entrance. Configure hoistway access such that the door cannot be opened by use of a common tool.
- 2.05 DOOR REOPENING DEVICES
- A. Door Screens: Install new door screens.

2.06 CAR ENCLOSURES

A. General:

1. Repaint exterior side of door to match existing, and repair and refinish interior stainless steel door finish.
2. New stainless steel wall panels on the door side of the cab; new plastic laminate wall panels on other 3 sides. Finishes to be selected by Owner from manufacturer's standards.
3. Provide an electric safety switch on each car top escape hatch and secure the hatch from the top side of the car.
4. Remove the existing car position indicator located above the door opening. Please a stainless steel cover over the hole and secure with counter sunk tamper proof screws.
5. Replace each existing car lighting fixture with new energy efficient, electronic ballast fixtures utilizing T8 lamps. Do not reduce the number or size of the lamps.
6. Handrails and Toe Guards:
 - a. Provide new handrail mounted to comply with ADA height requirements and new toe guards on rear and side walls.
7. Ceiling Panels: Replace all existing ceiling panels. Panels to be selected by Owner from manufacturer's standards.

2.07 HOISTWAY ENTRANCES

A. Hoistway Door Entrance and Panels: Reuse existing with the following alterations.

1. Provide all new hardware as specified elsewhere.
2. Each hoistway door panel shall be equipped with new door guides and door restraints.
3. Reuse each lobby sill.
4. Adjust all entrance equipment so as to provide a smooth and quiet door operation.
5. Each entrance upright shall be equipped with new Braille floor markers where existing might be lost, damaged, or nonexistent.

2.08 PASSENGER ELEVATORS

A. East Jail Elevator

1. Type: Geared overhead traction.
2. Drive Machine: To be reused, drained, cleaned, and serviced as required.
3. Rated Load: 2500 lb.
4. Rated Speed: 150 fpm
5. Landings: Four (4) in line 1-4
6. Operation System: Group operation as specified.
7. Auxiliary Operations:
 - a. Independent service.
 - b. Fire Service.
 - c. Hoistway Access.
 - d. Priority Return.
8. Car Enclosures: As existing as follows:
 - a. Inside Dimensions: Elevator contractor to verify in field.
 - b. Front Return Walls: Stainless Steel
 - c. Car Fixtures: Satin stainless steel.
 - d. Side and Rear Wall Panels: Plastic Laminate.
 - e. Strike Jamb: Stainless Steel
 - f. Car Door Finish (Interior): New stainless steel at front and rear, new plastic laminate at sides.
 - g. Car Sill: Reuse

- h. Ceiling: New lay in panels and lighting.
 - i. Handrails: Stainless Steel.
 - j. Flooring: New vinyl composition tile.
9. Hoistway Entrances: Reuse existing as follows:
- a. Width: As indicated on the Drawings.
 - b. Type: Two Speed Front Opening
 - c. Frames: Reuse. Provide Braille plates as needed.
 - d. Doors: Reuse. Provide new GAL hardware.
 - e. Sills: Reuse existing, clean and polish.
10. Hall Fixtures: New recessed with satin stainless steel.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elevator areas for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.02 INSTALLATION

- A. Notify the Owner 21 days in advance of the "shut down" date so as to notify all interested parties.
- B. As this building will be occupied during the elevator renovation, a 72 hour notice shall be required if there is any need to remove power to any portion of the building other than the elevator systems. In addition, should it become necessary to block any hall, lobby, or entrance for more than one (1) hour, 72 hour advanced notification shall be required.
- D. Comply with manufacturer's written instructions.
- E. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- F. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.
- G. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- H. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- I. Leveling Tolerance: 1/8 inch, up or down, regardless of load and direction of travel.

3.03 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of each elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required by ASME A17.1 and the AHJ.
- B. Operating Test: As part of the commissioning process, load elevators with rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record failure of elevators to perform as required.
 - 1. Perform operating test specified above on each elevator. Notify the Owner and Consultant 48 hours in advance to performing these tests.
- C. Notify Owner and Consultant three (3) days in advance of dates and times Acceptance Tests are to be performed on elevators.
- D. Keys: Provide the Owner no less than 3 (three) keys for every cylinder provided.
- E. Equipment Removal: The Elevator Contractor shall be required to remove from the premises all demolished and/or unused equipment on a daily basis. Locating a dumpster on site shall be discussed at the pre-construction meeting but under no circumstances shall the Contractor be allowed to place equipment or material in the Owner's Dumpsters.

3.04 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operation, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program. Instruct the Owner's representative in the proper procedures for testing firefighter's service.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.05 PROTECTION

- A. Entrance and Hoistway:
 - 1. Provide protective coverings, barriers, fencing, signs, and other procedures necessary to protect building staff and public at all times.
 - 2. Tool boxes and material boxes shall not be left open and unattended at any time.
 - 3. All materials shall be kept out of public areas.
 - 4. Tool box locations shall be coordinated with the Owner.

END OF SECTION 14210

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**SECTION 15050
MECHANICAL & PLUMBING GENERAL PROVISIONS**

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work contemplated under this section consists of the restoration of existing and/or installation of new Mechanical (HVAC) and Plumbing fixtures and/or equipment, as indicated and specified on the accompanying drawings and/or as specified herein or as directed by the Owner's representative.

1.02 SPECIAL INSTRUCTIONS, NOT CONTAINED HEREIN

- A. Contractors are referred to "Instructions to Bidders" for any special instructions that may affect work on this Project.

1.03 APPLICABLE CODES AND ORDINANCES

- A. All Mechanical and Plumbing work on this project shall be done in accordance with the requirements of applicable Federal, Municipal, County, and State codes, ordinances, or statutes. Each Contractor shall be responsible for familiarizing himself with all such requirements applicable to his work on this Project.
- B. **Cited references, or specified portions thereof, current at date of bidding documents, unless otherwise specified, govern the work. In conflict between cited standards and project specifications, do not proceed with any work until Engineer issues written clarification.**

1.04 LICENSES, PERMITS, AND INSPECTIONS

- A. Contractors shall secure all licenses and permits required for work on this project and shall arrange and pay for all inspections prescribed by applicable codes and ordinances. All such expenses incurred shall be included in the bid or proposal for work on this project.

1.05 PROJECT CLEAN-UP

- A. Upon completion of this project, contractors shall be required to:
1. Remove manufacturer's stickers, tags, marking, and other temporary identification from all equipment and accessories.
 2. Thoroughly clean all fixtures and other equipment provided as part of this project.
 3. Remove all markings on equipment and building surfaces placed during construction by this contractor.
 4. Remove all waste, scrap, excess, and offal entirely from this project.
 5. Provide any other clean-up service as required to present the best quality finished appearance a new project deserves.

1.06 SUBMITTALS

- A. Product data and Shop drawings: Submit as per individual Division 15 Sections and as per Section 01340.
- B. Substitutions: Manufacturers not named, or specified herein may be considered for use on this Project, upon request in writing to the Architect/Engineer, at least ten (10) days prior to the receipt of bids. Manufacturers not specifically named, or specified by Addenda, will not be considered for use on this Project. Also refer to individual Division 15 Sections for substitution requirements and Section 01630.

1.07 PLUMBING CONTRACTOR

- A. Base Bid, provide and install all plumbing work as shown and specified on the project drawings and/or described herein, but not necessarily limited to the following:
 - 1. Sanitary waste and vent piping systems within building as noted and specified on the project drawings, modifications and accommodations for installation of new fixtures and equipment.
 - 2. Domestic water piping system within building as noted on the project drawings, modifications and accommodations for installation of new fixtures and equipment..
 - 3. Plumbing fixtures and equipment installation and final connections.
 - 4. Natural gas piping, installation, modifications, final connections, and coordination to accommodate new fixtures and equipment.

1.08 MECHANICAL CONTRACTOR

- A. Base Bid, provide, perform, and/or install all mechanical work described hereafter, but not necessarily limited to the following:
 - 1. Mechanical equipment:
 - i) Thorough inspection, required service update, and cleaning existing gas furnaces, and cleaning of all supply and return air ductwork. Installation of new furnace filter. Clean exhaust fan ductwork.
 - ii) Thorough inspection, required service update, and cleaning of existing outdoor condensing units.
 - iii) Installation, modifications, and final connections for new exhaust fan fixtures installed at existing location.
 - 2. Miscellaneous Mechanical Equipment
 - 3. Condensate Drain Piping as required.
 - 4. Refrigerant Piping, Insulation and Accessories as required.
 - 5. Clean all Supply, Return, Exhaust, Grilles, Diffusers, and Ductwork Accessories.
 - 6. Clean and perform service update on Temperature Control System (thermostat) including wiring and terminations if required.
 - 7. Miscellaneous steel supports and bracing as required.

1.09 ELECTRICAL SERVICE CONNECTIONS BY OTHERS

- A. All plumbing equipment listed in 1.07 above.
- B. All mechanical equipment listed in 1.08 above.

1.10 RELATED WORK BY OTHERS

- A. Framed wall openings.
- B. Electric connections other than low voltage temperature control work.
- C. Thermostat (wall sensor) existing wall boxes (at existing location) and low voltage wiring empty conduit terminated above ceilings, if required.

1.11 RELATED SECTIONS

- A. Division 0 - Bidding & Contract Requirements
- B. Division 1 - General
- C. 07900 - Joint Sealers and fire stopping
- D. Division 16 - Electrical

1.12 REFERENCES

- A. As per individual Division 15 applicable codes and ordinances, Article 1.03, herein.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be suitably packaged by manufacturer to prevent damage during shipment. Damaged materials will not be acceptable for use.
- B. Store materials on site in clean, dry storage area; when outside, elevated above grade and enclosed with durable watertight wrapping.
- C. Handle all materials carefully to prevent damage. Minor scratches, marks, or blemishes to finish shall be repaired to satisfaction of Engineer.

END

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SECTION 16050

ELECTRICAL GENERAL PROVISIONS

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 all Division 16 specification sections.

1.2 SUMMARY

- A. Work under this section consists of electrical equipment coordination and common electrical installation requirements as indicated on the accompanying drawings and specified hereafter, or as directed by Owner or Owner's representative.
- B. The following general provisions are intended to supplement these sections of the specifications. In cases of conflicting requirements, the stipulations set forth in Division 01 specification sections supersede and must be satisfied by the contractor.

1.3 SPECIAL INSTRUCTIONS, NOT CONTAINED HEREIN

- A. The contractor for this work is referred to the drawings, bidding requirements, general conditions, special conditions, temporary services, and other pertinent sections of these specifications for any special instructions that may affect his bid or his work on this project.

1.4 APPLICABLE CODES AND ORDINANCES

- A. All work on this project shall conform with all applicable Federal, State and Local Laws, Codes and Ordinances including, but not limited to the latest approved additions of the following:
 - 1. National Electrical Code (NFPA 70).
 - 2. Life Safety Code (NFPA 101).
 - 3. State Building Codes.
 - 4. Occupational Safety and Health Act (OSHA).
 - 5. Americans with Disabilities Act (ADA).
- B. Cited references, or specified portions thereof, current at the date of bidding documents, unless otherwise specified, govern the work. In conflict between cited standards and project specifications, do not proceed with any work until Architect issues written clarification.

1.5 LICENSES, PERMITS, AND INSPECTIONS

- A. The contractor shall secure all licenses and permits required for work on this project and shall arrange for all inspections required by all codes and/or ordinances. All such fees or charges for licenses, permits, and inspections shall be paid for by the contractor and shall be included in his bid.

1.6 SUBMITTALS

- A. Submit shop drawings for materials, equipment and products as specified in the following specification sections.
- B. Contractor must furnish the brand of material and equipment listed in the specifications or their approved equals. Where more than one name is listed, contractor may select any one of the various brands specified.
- C. Contractor may use in his bid any other approved equal or similar brand of material and equipment not named or specified in these specifications. In order to be considered, the contractor must request approval to bid the substitution in writing no later than ten (10) days prior to the bid date. If permitted, the substitutions will be approved by addendum.
- D. Products and manufacturers not specifically named or specified in these specifications or approved by addendum, will not be considered for use on this project.

1.7 RECORD DRAWINGS

- A. Record all deviations from the construction documents on a set of prints, and deliver to Architect upon completion of project. Special attention must be given to record the locations of concealed and buried items to facilitate future location.

1.8 TEMPORARY CONSTRUCTION LIGHT AND POWER

- A. Power for miscellaneous hand tools and equipment used for construction work in areas of existing buildings to be remodeled may be obtained from existing building services.

1.9 SYSTEM DESCRIPTION

- A. Basic materials include, but not limited to the following:
 - 1. Conductors and cables.
 - 2. Hangers and supports.
 - 3. Conduit, raceways, and fittings.
 - 4. Boxes.
 - 5. Nameplates and labels.
 - 6. Wiring devices.
 - 7. Lighting fixtures.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be suitably packaged by manufacturer to prevent damage during shipment. Damaged materials will not be acceptable for use.
- B. Store materials on site in clean, dry storage area; when outside, elevated above grade and enclosed with durable watertight wrapping.
- C. Handle all materials carefully to prevent damage. Minor scratches, marks, or blemishes to finish shall be repaired to satisfaction of Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Contractor to furnish and install only those brands of equipment listed in these specifications or accepted by addenda as substitutes.

2.2 MATERIALS

- A. Provide all new materials of a quality not less than what is specified, without blemish or defect, in accord with standards specified and labeled by a Nationally Recognized Testing Laboratory (NRTL).

PART 3 - EXECUTION

3.1 COORDINATION

- A. Contractor is responsible for reading all specification sections covering work performed by other trades that may affect his work on this project.
- B. Coordinate work with other contractors regarding location and size of pipes, raceways, ducts, openings, switches, and outlets. Where required and possible, make minor adjustments to locations and mounting heights of equipment or apparatus to achieve coordination with equipment provided by other trades.
- C. System layout is schematic and exact locations and routing shall be determined in field based on structural elements and other conditions. All changes to system layout, other than minor adjustments required to coordinate with equipment provided by other trades, must be approved in writing by Architect before proceeding with work.
- D. Contractor is required to visit the site and fully familiarize himself with all conditions affecting the scope of work to be performed. Failure to visit the site prior to starting work shall not relieve the contractor from any responsibility regarding his work.
- E. Coordinate location, mounting, and support of equipment as follows:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide ample space for disconnecting, removal, repair, service, or other changes to equipment.
 - 3. To allow right-of-way for piping, ducts, and raceways installed at required slope.
 - 4. To insure that connecting raceways, cables, wireways, cable trays and busways will be clear of obstructions and of the working and access space of other equipment.
- F. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

3.2 INSTALLATION

- A. Furnish all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings.
- B. Include any minor items of work necessary to provide a complete and fully operational system that complies with all required codes.
- C. Comply with National Electrical Contractors Association (NECA) "Standard of Installation".
- D. Equipment or device mounting heights are measured to the bottom of unit for suspended items, and to the center of unit for wall mounted items.
- E. In mechanical and electrical equipment spaces, expose ceiling outlets and conduit with due consideration to ventilating ducts and mechanical piping. Where numerous ducts occur, install conduits and outlets after ventilating ducts have been installed. Puncturing of ductwork or hanging equipment such as light fixtures, ceiling hangers or conduits from ductwork is prohibited.
- F. Where cutting or drilling is required to facilitate raceway penetrations, patch and repair surfaces to their original state. Do not cut or drill structural members without prior written approval of Architect.
- G. Layout holes in advance. Notify Architect prior to drilling through structural sections, for determination of proper layout.
- H. Install buried conduits that pass from building interior to the exterior, below structural footing or grade beams, unless noted otherwise.
- I. Make floor, exterior wall, and roof seals watertight. Use PVC sleeves in walls and floors for precast holes, or core drill walls and floors as approved by Architect for installation of conduit. Caulk and seal annular space around conduit as specified herein.

3.3 PROTECTION AND CLEANING

- A. Protect all fixtures and equipment against damage from leaks or abuse and pay cost of repair or replacement of damaged items resulting from failure to provide suitable safeguards or protection.
 - B. Repair all dents and scratches in factory prime or finish coats on all electrical equipment. Replace equipment with new if damage is excessive.
 - C. Upon completion of this project, contractor shall be required to:
 - 1. Thoroughly clean all fixtures and equipment with manufacturer's recommended cleaning agents.
 - 2. Remove stickers, tags, marking, and other foreign matter from all fixtures and equipment.
 - 3. Remove all markings on equipment and building surfaces placed during construction by this contractor.
 - 4. Remove all waste, scrap, excess, and offal entirely from site.
 - 5. Provide any other clean-up services as required to leave every aspect of work in an acceptable, clean and ready-to-use condition.
- END OF SECTION 16050

SECTION 16070
HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hangers and supports for electrical equipment and systems.
- B. Related Sections:
 - 1. Section 16050 "Electrical General Provisions".
 - 2. Section 16131 "Raceways and Boxes".
 - 3. Section 16500 "Lighting Fixtures".

1.2 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. RMC: Rigid metal conduit.

1.3 SUBMITTALS

- A. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
 - 1. Trapeze hangers.
 - 2. Steel slotted-channel systems.
 - 3. Equipment supports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with ASTM.
- C. Comply with NFPA 70.
- D. Comply with ANSI.
- E. Perform work in accordance with NECA "Standard of Installation".
- F. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel".

1.5 PERFORMANCE AND COORDINATION REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected equipment and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed, with a minimum structural safety factor of five times the applied force.
- D. Coordinate installation of roof curbs, equipment supports, and roof penetrations with Division 07 contractor.
- E. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the work.
- F. Coordinate installation locations of electrical switchboards, panelboards, disconnect switches, circuit breaker enclosures, control enclosures, raceways, lighting fixtures, junction and pull boxes with all mechanical, plumbing and fire protection trades prior to installation of equipment and systems.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. B-line, an Eaton business.
 - b. ERICO International Corporation.
 - c. Thomas & Betts Corporation; A Member of the ABB Group.
 - d. Unistrut; Part of Atkore International.
 - 2. Material: Galvanized Steel.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) B-line, an Eaton business.
 - 2) Hilti, Inc.
 - 3) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 4) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05500 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT and RMC as scheduled in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps, single-bolt conduit clamps, or single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structural members as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with strength and anchorage requirements.
 - 9. Install surface mounted cabinets and panelboard enclosures with a minimum of four (4) anchors. In wet or damp locations, cabinets and panelboard enclosures shall be spaced off the wall surface a minimum of 1 inch using steel channel supports or strut.
 - 10. Conduits installed in the interior or exterior building walls shall be spaced off the wall surface a minimum of 1/4 inch using clamp-back straps or strut.
 - 11. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 12. Do not drill or cut structural members without prior written approval of Architect.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05500 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Touchup: Comply with requirements in Section 09900 "Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
 - 1. Clean field welds and abraded areas of shop paint.
 - 2. Paint exposed areas immediately after erecting hangers and supports.
 - 3. Use same materials as used for shop painting.
 - 4. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 5. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 16070

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SECTION 16075
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification nameplates.
7. Miscellaneous identification products.

B. Related Sections:

1. Section 16050 "Electrical General Provisions".
2. Section 16123 "Conductors and Cables".
3. Section 16131 "Raceways and Boxes".

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- F. Perform work in accordance with NECA "Standard of Installation".

PART 2 - PRODUCTS

2.1 RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on a white field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER - HIGH VOLTAGE".
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends. Labels sized to fit the raceway diameter, such that the clear shield overlaps the entire printed legend.
- E. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceways they identify, and that stay in place by gripping action.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends. Labels sized to fit the cable diameter, such that the clear shield overlaps the entire printed legend.
- C. Write-On Tags: Polyester tags, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Self-Adhesive Vinyl Tape: Colored, self-adhesive, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- D. Write-On Tags: Polyester tags, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 FLOOR MARKING TAPE

- A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70.
- B. Self-Adhesive Warning Signs: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
- B. Sign shall be punched or drilled for self-tapping stainless steel screws or stainless-steel machine screws with nuts and flat and lock washers. Self-adhesive signs are not permitted.

2.7 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Engraved, laminated acrylic or melamine plastic label, minimum 1/16 inch thick, with white letters on black background.
- B. Nameplate shall be punched or drilled for self-tapping stainless steel screws or stainless-steel machine screws with nuts and flat and lock washers. Self-adhesive nameplates are not permitted.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Toggle switch labels shall be hot stamped or engraved machine printing with 3/16 inch high black filled letters on face of plate.
- B. Receptacle labels shall be hot stamped or engraved machine printing with 3/16 inch high black filled letters on face of plate with durable wire markers on inside of box.
- C. Communications outlet labels shall be machine printed paper insert with black lettering located under clear label cover on face of plate with durable wire markers on inside of box.
- D. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
 - 1. Covers for all junction boxes containing emergency circuits shall be painted red.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box with self-adhesive vinyl labels containing the wiring system legend, system voltage, and panel/circuit number.
- B. Color Coding for Phase and Voltage Level Identification: Use wire insulation colors listed below for feeder and branch-circuit conductors.
 - 1. Colors for 120/240V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Neutral: White.
 - d. Ground: Green.
 - 2. Colors for 120/208V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green.

3. Color code all conductors and cables larger than color coded sizes available from manufacturer with field-applied, color-coding conductor tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
4. Switch loops may be any pastel color other than white, grey or green.
- C. Control Circuit Conductor Identification: Use write-on tags or self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
- D. Conductors to be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.
- E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, communications, and signal connections.
 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
- F. Communication Outlet Identification: Use labels to identify each outlet connection. Use system of designation that is uniform and consistent with cable identification. Use wire markers for cable inside of box to identify system and circuit designation. Label face of plate where indicated on drawings.
- G. Receptacle Identification: Use labels to identify each outlet connection. Use system of designation that is uniform and consistent with conductor identification. Use wire markers for conductors inside of box to identify panelboard and circuit number. Label face of plate where indicated on drawings.
- H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels to exterior of door, cover, or other access.
 1. Identify system voltage.
 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
 3. For equipment requiring workspace clearance according to NFPA 70, apply warning label to door or cover of equipment. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
 4. Color Scheme:
 - a. Emergency Warning Labels: Red letters on white background.
 - b. All Other Warning Labels: Black letters on yellow background.

5. Warning labels and signs shall include, but are not limited to, the following legends:

- a. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES".
- b. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES".

J. Operating Instruction Signs: Install instruction signs with black letters on white background with minimum 3/8-inch-high letters to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for emergency shutdown of generator.

L. Equipment Identification Nameplates: On each unit of equipment, install unique designation nameplate that is consistent with wiring diagrams, schedules, and operation and maintenance manual. Install nameplate unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Wording on nameplate shall contain the following:

- 1) Equipment designation.
- 2) System voltage.

b. For the following equipment, provide a single line of text with 1/2 inch high letters on 1-1/2 inch high nameplate; where two lines of text are required, use nameplates 2 inches high:

- 1) Panelboards.
- 2) Enclosures and electrical cabinets.
- 3) Disconnect switches.
- 4) Motor control starters.

c. For the following equipment, provide a single line of text with 1/4 inch high letters on 1 inch high nameplate; where two lines of text are required, use nameplates 1-1/2 inches high:

- 1) Access doors and panels for concealed electrical items.
- 2) Contactors and timeclocks.

d. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

END OF SECTION 16075

SECTION 16123
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Control-voltage conductors and cables.

B. Related Sections:

1. Section 16050 "Electrical General Provisions".
2. Section 16075 "Electrical Identification".
3. Section 16131 "Raceways and Boxes".

1.2 DEFINITIONS

- A. Control-Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- B. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Include data sheets for the following additional items:
1. Splices and terminations.
 2. Pulling compounds.
 3. Cable accessories.
 4. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with ASTM.
- C. Comply with UL 44, 83, and 486.

- D. Comply with NFPA 70.
- E. Comply with ANSI.
- F. Perform work in accordance with NECA "Standard of Installation".

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Belden Inc.
 - 2. General Cable Technologies Corporation.
 - 3. Southwire Company.
- B. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- E. Conductors: Annealed copper, complying with NEMA WC 70/ICEA S-95-658.
- F. Cable: Comply with NEMA WC 70 for armored cable Type MC, Type SO, and Type USE with ground wire.

2.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, Type XHHW-2, or Type USE single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or underground feeder cable, Type UF.
- E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- F. Feeders in Cable Tray: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.

- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or underground feeder cable, Type UF.
- J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- K. Branch Circuits in Cable Tray: Type THHN/THWN-2, Type XHHW-2 single conductors in raceway, or metal-clad cable Type MC where permitted in NFPA 70 for intended location and application.
- L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

2.3 CONTROL-VOLTAGE CONTROL CABLE

- A. Paired Cable: NFPA 70, Type CMG.
 - 1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with UL 1685.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with NFPA 262.
- C. Low-voltage control cables shall be installed in raceways where concealed in walls, floors or above ceilings. Low-voltage control cables may be installed exposed in open air provided the following criteria are satisfied.
 - 1. Cables are not subject to damage.
 - 2. Cables are provided with plenum rated jackets when installed in environmental air spaces.
 - 3. Cables are properly supported by J-hooks and/or bridle rings.

2.4 CONTROL CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN/THWN in raceway, complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, Type THHN/THWN in raceway, complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

2.5 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M Electrical Products.
 - 2. Hubbell Power Systems, Inc.
 - 3. Ideal Industries, Inc.
 - 4. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 5. Thomas & Betts Corporation; A Member of the ABB Group.
- B. Description: Factory-fabricated connectors and splices 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 application.
 - 1. Above grade circuits (No. 10 AWG and smaller):
 - a. Conductors shall be spliced together using solderless, screw-on, reusable pressure cable type connectors, rated 600 V, 90° C, with integral insulation, approved for copper conductors.
 - b. The integral insulator shall have a skirt to completely cover the stripped wires.
 - c. The number, size, and combination of conductors, as listed on the manufacturer's packaging, shall be strictly followed.
 - 2. Above grade circuits (No. 8 AWG and larger):
 - a. Conductors shall be spliced together using cable termination lugs made of high conductivity and corrosion-resistant material, electro-tin plated, listed for use with copper conductors only, rated for 600 V. Lugs shall be color coded by size.
 - b. Cable termination lugs shall be compression indent type, long barrel with chamfered entry; 1-hole type for less than 250 kcmil conductors, and 2-hole type for 250 kcmil conductors and above.
 - c. Install taped covering on cable termination lugs to maintain rated insulation level.
 - 3. Where not provided with equipment, use mechanical type lugs (allen-head screw type) to terminate wire.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.
- D. Verify that field measurements are as indicated.
- E. Examine walls, floors, roofs, and other construction for suitable conditions where electrical wiring and cabling will be installed.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.
- G. Completely and thoroughly swab raceway before installing wire.

3.2 CONDUCTOR MATERIAL APPLICATIONS

- A. Minimum Wire Size:
 - 1. #14 AWG conductors for lighting fixture whips in lengths not to exceed six (6) feet, unless noted otherwise.
 - 2. #12 AWG for power and lighting circuits, unless noted otherwise.
 - 3. #16 AWG conductors for low-voltage control cables and control circuit conductors, unless noted otherwise.
 - 4. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.
- B. Conductor sizes are based on copper. Unless the equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on NEC Table 310.15(B)(16) as appropriately modified by 310.15(B)(6).
- C. If aluminum conductor is substituted for copper conductor, size to match circuit requirements for conductor ampacity and voltage drop. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors. Verify the acceptance of using aluminum conductor with the Architect prior to designing around this type of conductor system.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Multiwire branch circuits complying with the NEC Article 210.4 will be acceptable. Provide each multiwire branch with a means to simultaneously disconnect all ungrounded conductors at the origin of the branch circuit complying with the NEC Sections 210.4.B and 240.15.B. The ungrounded and grounded circuit conductors of each multiwire branch circuit shall be grouped together complying with NEC Section 210.4.D.
- B. Wire and cable routing indicated is approximate unless dimensioned. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

- C. All feeder and branch circuit wiring shall be installed in raceways concealed in finished walls, ceilings, and floors unless otherwise indicated.
- D. Complete raceway installation between conductor and cable termination points according to Section 16131 "Raceways and Boxes" prior to pulling conductors and cables. Homerun conductors shall be installed unspliced from panelboard to first device or junction box.
- E. 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.
- F. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Pull all conductors into raceway at same time.
- G. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- H. Support cables according to Section 16070 "Hangers and Supports."
- I. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

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 and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- 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 16075 "Electrical Identification."
- 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 FIRESTOPPING

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

3.7 FIELD QUALITY CONTROL

- A. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding critical equipment and services for compliance with requirements.
- B. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Remove and replace non-compliant cables or wires and retest as specified above.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16123

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SECTION 16131
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Boxes, enclosures, and cabinets.
- B. Related Sections:
 - 1. Section 16050 "Electrical General Provisions".
 - 2. Section 16070 "Hangers and Supports".
 - 3. Section 16075 "Electrical Identification".
 - 4. Section 16123 "Conductors and Cables".

1.2 DEFINITIONS

- A. RMC: Rigid metal conduit.
- B. EMT: Electrical metallic tubing.
- C. FMC: Flexible metal conduit.
- D. LFMC: Liquidtight Flexible Metal Conduit.
- E. RNC: Rigid nonmetallic conduit.
- F. PVC: Polyvinyl chloride.

1.3 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with ASTM.
- C. Comply with NFPA 70.

- D. Comply with ANSI.
- E. Perform work in accordance with NECA "Standard of Installation".

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site and inspect for damage before use.
- B. Protect conduit from corrosion and entrance of debris by covering and storing above grade.
- C. Protect PVC conduit from direct sunlight.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, products of all manufacturers are acceptable provided they have a smooth interior, are listed and labeled by a qualified testing agency as defined in NFPA 70 for intended location and application. Conduit and fittings shall be obtained from the same manufacturer.
- B. RMC: Comply with ANSI C80.1 and UL 6.
- C. EMT: Comply with ANSI C80.3 and UL 797.
- D. FMC: Comply with UL 1; zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Fittings for RMC:
 - a. Material: Steel.
 - b. Type: Threaded.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Set screw – indoors: Compression - outdoors.
 - 3. Fittings for flexible conduit: NEMA FB 1 listed and labeled for type and size of raceway used, and for application and environment in which installed.
 - 4. Joint Compound for RMC: Listed and labeled as defined in NFPA 70 for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES

- A. Manufacturers: Subject to compliance with requirements, products of all manufacturers are acceptable provided they are listed and labeled by a qualified testing agency as defined in

NFPA 70 for intended location and application. Fittings shall be obtained from the same manufacturer.

- B. General Requirements for Boxes and Enclosures: Boxes and enclosures installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Metal Floor Boxes:
 - 1. Material: Cast metal or sheet metal.
 - 2. Type: Fully adjustable.
 - 3. Shape: Round or rectangular.
 - 4. Flush cover appropriate for use on carpet, tile, or wood-covered flooring as required.
- G. Nonmetallic Floor Boxes:
 - 1. Material: PVC.
 - 2. Type: Nonadjustable.
 - 3. Shape: Round or rectangular.
 - 4. Flush cover appropriate for use on carpet, tile, or wood-covered flooring as required.
- H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- I. Small Sheet Metal Pull and Junction Boxes 100 cu. in. and smaller: NEMA OS 1.
- J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum, galvanized steel, or cast iron with gasketed cover.
- K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

2.3 CABINETS AND ENCLOSURES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Hammond Manufacturing.
 - 3. Wiegmann.
- B. Cabinets:
 - 1. Comply with NEMA 250, Type 1 or Type 3R, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
- C. Hinged-Cover Enclosures:
1. Comply with UL 50 and NEMA 250, Type 1 or Type 3R, with removable interior panel and removable front.
 2. Continuous-hinge cover with flush latch unless otherwise indicated.
 3. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 4. Nonmetallic Enclosures: Plastic or fiberglass.
- D. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed and Subject to Physical Damage: RMC.
 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.
 5. Damp or Wet Locations: RMC.
 6. Raceways for Optical Fiber or Communications Cable: EMT.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, except as noted.
- B. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: RMC.
 2. Concealed Conduit, Aboveground: EMT or RMC.
 3. Underground Conduit: RNC, Type EPC-40-PVC or Type EPC-80-PVC,
 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.
- C. Minimum Raceway Size: 1/2 inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Metal Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Conduits: Use only fittings listed for use with this type of conduit. Use sealants recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use steel set-screw fittings for indoor applications and steel compression fittings for outdoor applications. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- 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. Install raceways a minimum 12 inches from ceiling grid, except as noted.
- D. Complete raceway installation before starting conductor installation.
- E. Comply with requirements in Section 16070 "Hangers and Supports for Electrical Systems" for hangers and supports.
 - 1. Do not support conduit with wire or perforated pipe straps.
 - 2. Do not attach conduit to ceiling support wires.
 - 3. Arrange conduit runs to maintain headroom and present a neat appearance.
 - 4. Where a number of conduits are to be run together, they shall be grouped and supported by trapeze hangers or unistrut racks.
- F. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- G. Install no more than the equivalent of three 90-degree bends in any conduit run. Support conduit within 12 inches of changes in direction.
- H. In finished areas, conceal conduit and EMT within walls, ceilings, chases, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- I. In unfinished areas, run conduit and EMT exposed on walls or ceilings. Install conduits parallel or perpendicular to building lines.
- J. Support conduit within 12 inches of enclosures to which attached.
- K. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location. Fittings shall be concrete tight.
- L. Raceways Below Slabs:
 - 1. Minimum conduit size shall be 1 inch.
 - 2. Change from PVC conduit to RMC or EMT before rising above floor.
- M. Stub-ups to Above Recessed Ceilings for Optical Fiber and Communications Cables:

1. Conduit type: EMT.
 - a. Minimum size 3/4 inch for conduit runs up to 50 feet.
 - b. Minimum size 1 inch for conduit runs more than 50 feet.
 2. Install a maximum of two 90-degree bends or equivalent, for each length of raceway unless noted otherwise. Comply with these requirements by providing pull or junction boxes in conduit run as required.
 3. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. 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.
- O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4 inch trade size and insulated throat metal bushings on 1-1/2 inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- U. Surface Raceways:
1. Install surface raceway with a minimum 2-inch radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section.
 3. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Y. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
 2. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 3. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 4. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 5. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 6. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3.
1. Use FMC in dry areas not subject to physical damage.
 2. Use LFMC in damp or wet locations subject to physical damage.
 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires.
 4. Use a maximum of 48 inches of flexible conduit for final connections to motors or equipment subject to vibration, noise transmission, or movement, and for primary and secondary connections to dry-type transformers.
- AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box, unless otherwise indicated, as follows:
1. Switches: 48 inches above finished floor.
 2. Receptacles or telephone/data outlets: 16 inches above finished floor.
 3. Outdoor receptacles: 24 inches above grade or roof surface.
 4. Switches, receptacles, or telephone/data outlets at counters: 12 inches above surface.
- BB. 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. Prepare block surfaces to provide a flat surface for a rain-tight connection between box and cover plate or supported equipment and box.

- CC. When flush mounted boxes are installed back-to-back in walls, provide a barrier between boxes consisting of two layers of 5/8" gypsum wallboard to minimize sound transfer and maintain fire rating where applicable. If barrier is not installed between back-to-back boxes, provide minimum 6 inch horizontal separation. Provide minimum 24 inch separation in acoustic-rated walls.
- DD. Locate boxes so that cover or plate will not span different building finishes.
- EE. Support boxes of three gangs or more by spanning two framing members or mounting on brackets specifically designed for the purpose.
- FF. Support boxes per NFPA 70 Article 314.
- GG. Set metal floor boxes level and flush with finished floor surface.
- HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVES FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at raceway penetrations of exterior floor and wall assemblies.
 - 1. Cut sleeves to length for mounting flush with both surfaces of wall.
 - 2. Extend sleeves installed in floors 2 inches above finished floor.
 - 3. Size pipe sleeves to provide 1/4 inch annular clear space around raceway, unless sleeve seal is to be installed.
- B. Concrete Slabs and Below Grade Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls
 - 1. 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. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 1. Sleeves for rectangular openings: Galvanized sheet steel of length required to suit application.
 - a. For rectangular perimeter cross-section less than 50 inches and no side greater than 16 inches, minimum thickness shall be 0.052 inches.
 - b. For rectangular perimeter cross-section equal to or greater than 50 inches and one or more sides equal to, or greater than 16 inches, minimum thickness shall be 0.138 inches.
- D. Seal space outside of sleeves with grout for penetrations of concrete and masonry, and with approved joint compound for gypsum board assemblies.
- E. 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. Refer to Division 07 Section "Joint Sealants" for materials and installation requirements.
- F. Fire-Rated Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves with firestop materials. Comply with Division 07 Section "Penetration Firestopping".

- G. Roof Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- H. 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.

3.4 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 16131

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SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Straight-blade receptacles.
2. GFCI receptacles.
3. Toggle switches.
4. Wall plates.

B. Related Sections:

1. Section 16050 "Electrical General Provisions".
2. Section 16131 "Raceways and Boxes".

1.2 DEFINITIONS

- A.** EMI: Electromagnetic Interference.
- B.** GFCI: Ground-Fault Circuit Interrupter.
- C.** RFI: Radio-Frequency Interference.
- D.** SPD: Surge Protective Device.
- E.** UTP: Unshielded Twisted Pair.
- F.** Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.3 SUBMITTALS

- A.** Product Data: For each type of product.
- B.** Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.4 QUALITY ASSURANCE

- A.** Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B.** Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- C.** Comply with NFPA 70.

- D. Perform work in accordance with NECA "Standard of Installation".

1.5 COORDINATION

- A. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.
- B. Devices for Owner-Furnished Equipment and Equipment Furnished by Others:
 - 1. Receptacles: Match plug configuration.
 - 2. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Abbreviations of manufacturers' names shown in parentheses.
 - 1. Cooper Wiring Devices (Arrow Hart).
 - 2. Hubbell Wiring Device-Kellems (Hubbell).
 - 3. Leviton Manufacturing Co., Inc. (Leviton).
 - 4. Legrand (Pass & Seymour).

2.2 GENERAL WIRING DEVICE REQUIREMENTS

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System:
 - a. Aluminum surface raceway: GRAY.
 - b. Finished spaces: WHITE.
 - c. Unfinished spaces: GRAY.
 - 2. Motor control switches: BROWN.
 - 3. Wiring Devices Connected to Emergency Power System: RED.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Receptacles, 125 V, 20 A: Heavy duty specification grade complying with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Subject to compliance with requirements, provide one of the following:
 - a. Arrow Hart - 5362.
 - b. Hubbell - 5362.
 - c. Leviton - 5362.
 - d. Pass & Seymour - 5362.

- B. Single Receptacles, 125 V, 20 A: Heavy duty specification grade complying with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Subject to compliance with requirements, provide one of the following:

- a. Arrow Hart – 5361.
- b. Hubbell – 5361.
- c. Leviton – 5361.
- d. Pass & Seymour – 5361.

- C. Tamper-Resistant, Duplex Receptacles, 125 V, 20 A: Heavy duty specification grade complying with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Subject to compliance with requirements, provide one of the following:

- a. Arrow Hart - TR5362.
- b. Hubbell – 5362TR.
- c. Leviton – 5362-SGT.
- d. Pass & Seymour – TR5362.

2.4 GFCI RECEPTACLES

- A. General Description: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.

- 1. 125 V, 20 A, straight blade, feed-through type. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.
- 2. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

- B. Duplex GFCI Receptacles:

1. Subject to compliance with requirements, provide one of the following:

- a. Arrow Hart – SGF20.
- b. Hubbell – GFST20.
- c. Leviton – GFNT2.
- d. Pass & Seymour – 2097.

- C. Tamper-Resistant, Duplex GFCI Receptacles:

1. Subject to compliance with requirements, provide one of the following:

- a. Arrow Hart – TRSGF20.
- b. Hubbell – GFR5362SG.
- c. Leviton – GFTR2.
- d. Pass & Seymour – 2097TR.

2.5 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

- B. Switches, 120/277 V, 20 A:

1. Subject to compliance with requirements, provide one of the following:

a. Single Pole:

- 1) Arrow Hart – 1221.
- 2) Hubbell – CS1221.
- 3) Leviton – 1221-2.
- 4) Pass & Seymour – CS20AC1.

b. Two Pole:

- 1) Cooper – 1222.
- 2) Hubbell – CS1222.
- 3) Leviton – 1222-2.
- 4) Pass & Seymour – CS20AC2.

c. Three Way:

- 1) Cooper – 1223.
- 2) Hubbell – CS1223.
- 3) Leviton – 1223-2.
- 4) Pass & Seymour – CS20AC3.

d. Four Way:

- 1) Cooper – 1224.
- 2) Hubbell – CS1224.
- 3) Leviton – 1224-2.
- 4) Pass & Seymour – CS20AC4.

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic, color to match device.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 RECEPTACLE APPLICATION

A. Where required by the current version of the NEC: GFCI receptacles.

3.2 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical. Group adjacent switches under single, multigang wall plates.
- H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.3 IDENTIFICATION

- A. Comply with Section 16075 "Electrical Identification."

3.4 FIELD QUALITY CONTROL

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- D. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 16140

SECTION 16500
LIGHTING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior luminaires.
 - 2. Luminaire supports.
- B. Related Sections:
 - 1. Section 16050 "Electrical General Provisions".
 - 2. Section 16070 "Hangers and Supports".
 - 3. Section 16123 "Conductors and Cables".
 - 4. Section 16131 "Raceways and Boxes".

1.2 DEFINITIONS

- A. BF: Ballast Factor.
- B. CCT: Correlated Color Temperature.
- C. CRI: Color Rendering Index.
- D. LED: Light emitting diode.
- E. LER: Luminaire efficacy rating.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 SUBMITTALS

- A. Product Data: For each type of luminaire, arranged in order of luminaire designation. Include data on features, accessories, finishes, and the following:
 - 1. Material and physical description of luminaires including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Low voltage transformers.
 - 4. LED power supplies
 - 5. Energy-efficiency data.
 - 6. Life, output (lumens, CCT, and CRI), and energy efficiency data for lamps.

7. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the luminaire as applied in this Project. Photometric data shall be certified by a qualified independent testing agency, in IESNA format, based on certified results of laboratory tests of each luminaire type, outfitted with lamps, ballasts and accessories identical to those indicated for the luminaire as applied in the Project.

- a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings:

1. Show details of nonstandard or custom luminaires.
2. Indicate dimensions, weights, method of field assembly, location and size of each field connection, mounting and attachment details, required clearances, components, features and accessories.
3. For custom luminaires, modified luminaires or linear fluorescent luminaires mounted in continuous rows, submit scaled drawings prepared by the manufacturer showing all details of construction, lengths in runs, pendant or power feed locations, accessories, finishes and lists of materials.
4. This Contractor shall provide the manufacturer with accurate field dimensions where required.
5. Include wiring diagrams for power, signal, and control wiring. Wiring diagrams shall detail wiring for luminaires and differentiate between manufacturer installed and field installed wiring.

C. Product Certificates shall be signed by manufacturers of luminaires certifying that products comply with requirements.

D. Pole and Support Component Certificates: Signed by Manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a Professional Engineer.

E. Operation and Maintenance Data shall be provided for luminaires and equipment to include in emergency, operation and maintenance manuals specified in specifications section describing Operations and Maintenance Data.

F. Field quality control test reports.

G. Sample warranty.

H. Special warranties if specified.

I. Product samples complete with housing, trim, specified lamp, and 8' cord with plug shall be submitted if requested.

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 the Authorities Having Jurisdiction, and marked for intended use.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- C. Source Limitations: Obtain each type of product from single source from single manufacturer.
- D. Comply with NFPA 70.
- E. Perform work in accordance with NECA "Standard of Installation".

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver luminaires individually wrapped in factory fabricated fiberboard type containers. Parabolic louvers shall be shipped in thermally sealed polyethylene wrapper. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.
- B. Handle luminaires carefully to prevent breakage, denting and scouring of the luminaire finish.
- C. Store luminaires in a clean, dry space protected from weather.
- D. Package poles for shipping according to ASTM B 660.
- E. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- F. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle with web fabric straps.

1.6 COORDINATION

- A. Coordinate layout and installation of luminaires with ceiling system and other construction that penetrates ceilings or is supported by them including mechanical system, fire suppression, technology, and partition assemblies.
- B. Provide all frames, supplementary support structures, hangers, spacers, stems, aligner canopies, auxiliary junction boxes and other hardware as required for a complete and proper installation. Recessed luminaires shall have frames that are compatible with the ceiling system.
- C. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- D. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.
- E. Coordinate depth and location of all luminaire pole bases in all areas.

1.7 WARRANTY

- A. General Warranty for Luminaires: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty for LED arrays and Drivers: Manufacturers standard form in which manufacturer of LED arrays and drivers agrees to replace components that fail in materials or workmanship within specified warranty period.
 - 1. LED arrays: 5 years from date of substantial completion.
 - 2. Drivers: 5 years from date of substantial completion.
- C. Warranty for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. See Lighting Fixture Schedule on Drawings

2.2 GENERAL REQUIREMENTS FOR INTERIOR LUMINAIRES

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Recessed Luminaires: Comply with NEMA LE 4 for ceiling compatibility.
- C. Metal Parts: Free of burrs, sharp corners and edges. Metal work shall be free of tool marks and dents and shall have accurate angles bent as sharply as compatible with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All miters shall be in accurate alignment with abutting intersection members.
- D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging. Luminaires to be painted after fabrication. Finish ferrous mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.
- E. Luminaire hardware to comply with the following material standards: For steel and aluminum luminaires, all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel luminaires, all hardware shall be stainless steel. For bronze luminaires, all hardware shall be stainless steel or bronze, unless otherwise noted.

- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Safety devices shall be detachable if necessary and shall not interfere with luminaire performance, maintenance or the seating of any luminaire element. Safety device shall not be visible during normal luminaire operation and from normal viewing angles.
- G. Luminaires provided shall have means for disconnection from power source during service, as required in NEC Article 410.
- H. Reflecting Surfaces: Minimum reflectance as follows, unless indicated otherwise:
1. White Surfaces: 85%
 2. Specular Surfaces: 90%
 3. Diffusing Specular Surfaces: 75%
- I. Reflector cones shall adhere to the following:
1. Cones designed for vertically mounted lamps shall provide a minimum of 45 degree cutoff of lamp and lamp image. Cones designed for horizontally mounted lamps shall provide a minimum of 55 degree cutoff of lamp and lamp image. These shall be no visible lamp flashing in the cone.
 2. Plastic material shall not be used for reflector cones, unless otherwise specified.
 3. Cones shall not be permanently fastened to the housing of ceiling and shall be removable without tools. Retention devices shall not deform the cone or be visible from normal viewing angles.
 4. Trim shall be flush to ceiling without gaps or light leaks. Where the flange trim is separate from the cone, it shall have the same finish as the reflector cone. Cones with parabolic cross louvers shall be parallel and perpendicular to adjacent walls.
 5. Reflector cones shall be uniform gauge, not less than 0.032" thick, high purity aluminum Alcoa 3002 alloy. Cones shall be free from spin marks or other defects.
 6. Manufacture cone using the Alzak process. Refer to Luminaire Schedule for cone color and finish, i.e., specular or diffuse requirements. For compact fluorescent luminaires, finish shall eliminate iridescence.
- J. Lenses, Covers, Diffusers and Globes:
1. Acrylic Lighting Diffusers: 100% virgin acrylic plastic. UV stabilized, 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 otherwise indicated.
 - b. Lenses shall have uniform brightness throughout the entire visible area.
 2. Glass: Annealed crystal glass unless otherwise indicated.
- K. Adjustable luminaires shall have positive locking devices to fix aiming angle. Luminaires shall be capable of being relamped without adjusting aiming angle.
- L. Luminaires recessed in suspended ceilings where the space above the ceiling is either an air supply or return plenum shall conform to NEC Article 300-22.
- M. Provide plaster frame for recessed luminaires mounted in other than T-bar ceilings. Verify mounting with architectural reflected ceiling plan before ordering luminaires.

- N. For weatherproof or vapor-tight installations, painted finishes of luminaires and accessories shall be weather resistant enamel using proper primers or galvanized and bonded epoxy, so that the entire assembly is completely corrosion resistant for the service intended. Exterior finishes shall have an outdoor life expectancy of not less than 20 years without any visible rust or corrosion. Where aluminum parts come in contact with bronze or steel parts, apply a coating material to both surfaces to prevent corrosion.
- O. Luminaires for use in areas designated as damp locations shall be suitable gasketed to prevent the entrance of moisture. Provide approved wire mesh screens for ventilation openings. Dissimilar metals shall be separated by non-conductive material to prevent galvanic action.
- P. Luminaires shall be free of light leaks while providing sufficient ventilation of lamps to provide the required photometric performance.

2.3 INTERIOR LED LUMINAIRES AND DRIVERS

A. Interior Luminaires:

- 1. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.
- 2. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.
- 3. Comply with In-Situ testing for more reliable results.
- 4. LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.
- 5. LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.
- 6. LED luminaires shall deliver a minimum of 60 lumens per watt.
 - a. LED's shall be "Bin No. 1" quality.
- 7. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.
- 8. The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.
- 9. LED color temperatures: CRI> 85, 2700K as noted +/- 145K.
- 10. LED color temperatures: CRI> 85, 4000K as noted +/- 275K.
- 11. LED color temperatures: CRI> 85, 5000K as noted +/- 283K.
- 12. Luminaires shall have internal thermal protection.
- 13. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.
- 14. Color spatial uniformity shall be within .004 of CIE 1976 diagram.
- 15. Color maintenance over rated life shall be within .007 of CIE 1976.
- 16. Indoor luminaires shall have a minimum CRI of 85.
- 17. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management
- 18. LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.
- 19. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

B. Power Supplies and Drivers:

- 1. Power Factor: 0.90 or higher

2. Maximum driver case temperature not to exceed driver manufacturer recommended in-situ operation.
3. Output operating frequency: 60Hz.
4. Interference: EMI and RFI compliant with FCC 47 CFR Part 15.
5. Total Harmonic Distortion Rating: 20% Maximum.
6. Meet electrical and thermal conditions as described in LM-80 Section 5.0.
7. Primary Current: Confirm primary current with Drawings.
8. Secondary Current: Confirm secondary current specified by individual luminaire manufacturers.
9. Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified control components.
10. Solid-state control components to be integral or external per each specified luminaire. Remote control gear to be enclosed in Class 1, Class 2, or NEMA 3R enclosures as required.

C. Controller and Control System

1. System electronics driver / controller to use coordinated communication protocols: DMX512, 0-10V, DALI, or proprietary as required
2. The Contractor to ensure that external control equipment is compatible with LED control requirements
3. Provide connector types and wiring as appropriate for un-interrupted communication between devices, considering distance maximums, field obstructions, and accessibility. Ensure that connection points are optically isolated for system noise reduction.
4. For control components that are part of overall area control system see Dimming Controls Specifications.
5. Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified power supplies and/or drivers.

2.4 GENERAL REQUIREMENTS FOR LUMINAIRE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- B. Twin-Stem Hangers: 1/2-inch steel tubes with single canopy arranged to mount a single fixture. Finish shall be the same as the luminaire.
- C. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- D. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.
- E. Aircraft Cable Support shall use cable, anchorages, and intermediate supports recommended by luminaire manufacturer.
- F. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gauge.
- G. Wires for humid spaces shall be ASTM A 580/A 580M, composition 302 or 304, annealed stainless steel, 12 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Luminaires:
 - 1. Install luminaires level, plumb, and square with ceilings and walls, and secure according to manufacturers written instructions and approved submittal materials, unless otherwise indicated.
 - 2. Comply with NECA 1.
- B. Temporary Lighting: If approved by the Architect, use permanent luminaires for temporary lighting. Install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires; disassemble, clean, install new lamps, and reinstall luminaires.
- C. Mounting height indicated from finished floor to bottom of pendant luminaire unless otherwise noted. Verify mounting heights with Architect.
- D. Mounting height indicated to the center of the outlet box for wall mounted luminaires unless otherwise noted. Verify mounting heights with Architect.
- E. Ceiling Grid-Mounted Luminaire Supports:
 - 1. Secure to any required outlet box.
 - 2. Secure luminaire to the ceiling grid tees, using approved fasteners or clips that are UL listed for the application.
 - 3. Luminaires of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two 3/4-inch metal channels spanning and secured to ceiling grid tees.
- F. Suspended Luminaire Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
 - 5. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 6. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
 - 7. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

8. All power feeds shall originate from the same location/end of each run.
- G. Flush-Mounted Luminaire Supports:
1. Secured to outlet box.
 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 3. Trim ring flush with finished surface.
- H. Wall-Mounted Luminaire Support:
1. Attach to junction box securely fastened to building structure or to manufacturer supplied mounting bracket or wall plate. Do not attach luminaires directly to gypsum board.
- I. Provide all necessary hanging or mounting devices and accessories for all luminaires. Verify the types needed for various ceiling conditions. Plaster rings shall be provided where required.
- J. Verify weight and mounting method of all luminaires prior to ordering and provide suitable support. Coordinate with General Contractor for luminaires that require additional blocking or support. Luminaire mounting assemblies shall comply with all local seismic codes and regulations.
- K. Metal decking shall not be pierced for luminaire support.
- L. Refer to architectural reflected ceiling plans for coordination of luminaire locations with mechanical, fire protection, technology and fire safety equipment. Where conflicts occur, coordinate with Architect prior to installing any of the Systems.
- M. In accessible suspended ceilings, luminaire wiring connections, including equipment grounding conductor, is to be through use of 72-inch maximum flexible conduit from a rigidly supported junction box.
- N. Wire per requirements of branch circuit installation. Properly ground each luminaire.
- O. Luminaires located in recessed ceilings with a fire resistive rating of 1 hour or more shall be enclosed in an approved fire resistive rated box equal to that of the ceiling. Acoustical ceiling tiles are not acceptable.
- P. Install luminaires with vent holes free of air blocking obstacles.
- Q. This Contractor shall be responsible for adjusting aperture flanges or rings on all recessed luminaires to be flush with the finished ceiling. Trim shall completely conceal ceiling opening.
- R. Brace suspended luminaires installed near ducts or other elements so that they do not swing into obstructions.
- S. Luminaires shall not be secured to ductwork or other systems.
- T. Comply with requirements in Section 16123 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 16131 "Raceways and Boxes." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 CLEANING AND ADJUSTING

- A. Remove protective plastic covers from luminaires and luminaire diffusers only after construction work, painting and clean-up are completed. Remove, clean, and reinstall all dirty lamps, reflectors and diffusers.
- B. Clean luminaires internally and externally after installation. Use methods and materials recommended by manufacturer for cleaning Alzak reflectors and other surfaces.
- C. Make final adjustment of aimable luminaires and adjustable light settings under the direction of the Architect during a scheduled period of time prior to the completion of the Project, after normal business hours if required. Include all equipment and personnel expenses including overtime required for focusing.
- D. Luminaires, reflectors, louvers and accessories which are damaged, blemished, or impregnated with fingerprints shall be replaced at this Contractor's expense. All finishes shall be unmarred upon Project completion.

3.5 FIELD QUALITY CONTROL

- A. 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.
- B. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- C. Luminaire will be considered defective if it does not pass operation tests and inspections. Replace or repair luminaire, then retest. Repeat procedure until units operate properly.
- D. Replace all burned out or inoperative LED arrays at time of Substantial Completion, prior to Owner occupancy.
- E. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Verify operation of photoelectric controls.
- F. Malfunctioning Luminaires and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- G. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

- a. IES LM-5 "Guide for Photometric Measurements of Area and Sports Lighting Installations".
 - b. IES LM-50 "Guide for Photometric Measurement of Roadway Lighting Installations".
 - c. IES LM-52 "Guide for Photometric Measurements of Roadway Sign Installations".
 - d. IES LM-64 "Guide for Photometric Measurements of Parking Areas".
 - e. IES LM-72 "Directional Positioning of Photometric Data".
- H. 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 16500

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