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**IFB NO. Y16-780-CC**

**INVITATION FOR BIDS  
FOR  
CASSADY AND SHERIFF SECTOR IV ELEVATOR MODERNIZATION**

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**PART H  
TECHNICAL SPECIFICATIONS**

**VOLUME II**



**ORANGE COUNTY CORRECTIONS  
SHERIFF SECTOR IV ELEVATOR MODERNIZATION  
BID DOCUMENTS**

**FOR  
ORANGE COUNTY  
CAPITAL PROJECTS  
IOC II, 400 EAST SOUTH STREET  
ORLANDO, FLORIDA 32801**

**BY  
MATERN PROFESSIONAL ENGINEERING, INC.  
130 CANDACE DRIVE  
MAITLAND, FLORIDA 32751**

**MAY 3, 2016**

**ORANGE COUNTY CORRECTIONS  
SHERIFF SECTOR IV ELEVATOR MODERNIZATION  
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MAY 3, 2016**

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M001	GENERAL NOTES AND LEGENDS - MECHANICAL	NONE
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M601	DETAILS – MECHANICAL	AS NOTED

<u>SHEET #</u>	<u>ELECTRICAL SHEET INDEX</u>	<u>SCALE</u>
E001	GENERAL NOTES, LEGENDS AND SHEET INDEX	NONE
E002	SYMBOL LEGEND AND FIXTURE SCHEDULE	NONE
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E101	PARTIAL FLOOR PLANS DEMO AND RENO – ELECTRICAL	1/4"=1'-0"
E501	ELECTRICAL SCHEDULES	NONE
E901	DETAILS ELECTRICAL	NONE

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SECTION 00 21 00

INSTRUCTIONS TO ELEVATOR CONTRACTOR

PART 1 - GENERAL

1.1 EXAMINATION

- A. In order to discover and resolve conflicts or lack of definition which might create problems, Contractor must review Contract Documents, existing site conditions, and existing equipment specified to be retained for compatibility with its product prior to submitting Bid. Site review shall include, but not be limited to: adequacy of access, retained equipment, elevator hoistways, pits, machine rooms, overhead clearances, electrical power characteristics, structural supports, etc. Investigation and structural calculations required to determine compliance of existing elevator components including machine support beams, with ASME A17.1 are responsibility of Contractor. Owner will not pay for change to building structure, structural supports, mechanical, electrical, or other systems required to accommodate Contractor's equipment.
- B. Submission of Bid is considered evidence that Contractor has visited and is conversant with the site facilities, site conditions, requirements of the Contract Documents, pertinent state and local codes, state of labor and material markets, and has made due allowance in his Bid for all contingencies. Should Contractor's investigation of site conditions or local codes or rules reveal requirements contrary to Contract Documents, or if Contractor finds any discrepancies or omissions from Contract Documents, or if Contractor is in doubt as to their meaning, it shall contact the Owner for clarification at least ten (10) working days prior to Bid due date.
- C. No oral explanation will be made and no oral instructions will be given before Bid due date. Contractor shall act promptly and allow sufficient time for a reply to reach it before submission of its Bid. Any required interpretation or supplemental instructions will be issued in the form of an addendum to the specifications and forwarded to all Contractors.
- D. Provide everything necessary for and incidental to the satisfactory completion of work required by Contract Documents. All required preparations and hoisting and movement of equipment, or removal of existing equipment shall be the responsibility of Contractor.

PART 2 – PRODUCTS – Not Applicable

PART 3 – EXECUTION – Not Applicable

END OF SECTION 00 21 00

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. When the titles such as Engineer, Project Engineer, or Owner are used throughout the specification, this implies Orange County as property owner and/or an officially appointed County Representative.

1.2 PROJECT DESCRIPTION

- A. Performance of all tasks specified in the contract documents shall be the responsibility of the contractor unless specified otherwise.

1.3 SCOPE OF WORK

A. Summary Of Work:

1. HVAC:

- a. Provide firestopping to all penetrations.
- b. Remove existing grilles in elevator machine room and patch/repair to match existing wall rating.
- c. Provide ductless split system to elevator machine room as shown on plans.

2. Electrical:

- a. To disconnect existing elevator power, cab-light power, and fire alarm interface to prepare for replacement
- b. Reconnect new elevator power, cab-light power, and fire alarm interface.
- c. Replace Elevator Pit receptacles and lighting as indicated on plans.
- d. Reconnect and provide any additional fire alarm programming and devices as indicated on plans.

3. Modernize 1 Hydraulic elevator (Summary)

- a. New Power Unit
- b. New Controller
- c. New Car Operating Panels
- d. New Hall Stations
- e. New Lanterns.
- f. New Door Equipment as specified.
- g. New Inspection Car Top Station
- h. New Cab Interiors
- i. Most Applicable Stringent Code Compliant Installation.

4. Provide all labor, engineering, tools, transportation, services, supervision, materials, and equipment necessary for and incidental to satisfactory completion of required work as indicated in Contract Documents.

5. Provide all required staging, hoisting, and movement of new equipment, reused equipment, or removal of existing equipment.

6. Applicable conditions of Owner's General, Special, and Supplemental Conditions.

7. Prime contracts are defined below and each is recognized to be a major part of required work to be performed concurrently in close coordination with work of other Contractors.

8. Scope of Contract includes, but is not limited to, the following:

- a. Coordination, scheduling, and management of work of component suppliers and

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subcontractors.

- b. Modernize or furnish and install equipment as specified utilizing existing and/or modified hoistways and machine rooms or newly constructed hoistways and machine rooms.
- c. Specific item of required work which cannot be determined to be included in another contract is thereby determined to be included in prime contract.
- d. Coordinating with and assisting all subcontractors. No additional fees will be accepted for coordination and assisting subcontractors.

1.4 CONTRACTOR RESPONSIBILITIES

- A. The contractor shall have all submittals approved by the Engineer and accepted by the Owner prior to the start of active construction.
- B. The contractor shall have all equipment and material onsite prior to the start of active construction.
- C. The contractor shall submit to the Owner prior to the project pre-construction meeting the following:
  - Schedule of Values
  - Construction Schedule
  - Submittal Schedule
  - Emergency Telephone List including subcontractors and suppliers
- D. The contractor shall field verify existing conditions of construction prior to start of active construction.
- E. The contractor shall coordinate with the Owner on the operation of the existing fire alarm system prior to the start of active construction. There shall be an action plan for the operation of the fire alarm system during construction submitted by the contractor to the Owner for acceptance. This action plan shall be in place prior to the start of active construction. Any false fire alarms that occur during construction and deemed by the Owner to be the fault of the contractor, the contractor shall pay all costs incurred from the local fire department for responding to a false alarm.
- F. The contractor is responsible for moving furniture and/or equipment if necessary to perform the work included in the contract. The contractor is responsible for placing the furniture and/or equipment back in its original location. The contractor is responsible for any damages to furniture, equipment, etc., which occur during construction. The contractor shall provide protection for floors, walls, furniture, equipment and any other items that may be subject to damage during the construction periods and will be required to repair or replace to original or better condition.
- G. The contractor shall coordinate with the Owner on the operation of the security alarm system prior to the start of active construction. The contractor shall submit an action plan for operation of the security alarm system during construction to the Owner for acceptance prior to start of active construction. This action plan shall be in place prior to the start of active construction. Any false security alarms that occur during construction and deemed by the Owner to be the fault of the contractor, the contractor shall pay all cost incurred from the local police and/or sheriff department for responding to a false alarm.
- H. The contractor shall take digital pictures or video of pre-existing conditions of the interior and exterior of the building prior to the start of active construction. Failure to provide digital pictures or video prior to start of construction places the responsibility on the Contractor to complete the necessary replacement, repairs, and/or cleaning as determined by the Owner, at no additional cost to the Owner. One CD copy of digital pictures or video of the existing site conditions shall be submitted to the Owner.



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- I. The contractor shall at all times maintain daily cleanup of construction areas. Costs for work areas that are not cleaned by the contractor will be cleaned by the Owner and those costs shall be charged back to the contractor via change order.
- J. The contractor shall provide a construction schedule to the Owner's Project Manager prior to the pre-construction meeting.
- K. The contractor shall update the construction schedule weekly and submit it to the Owner's Project Manager for review.
- L. Elevator Contractor's duties include the following:
  - 1. Provide and pay for labor, materials and equipment, tools, construction equipment and machinery, and other facilities and services necessary for proper execution and completion of required work.
  - 2. Pay for legally required sales, consumer, and state remodel taxes.
  - 3. Secure and pay for required permits, fees and licenses necessary for proper execution and completion of required work, as applicable at time of quotation due date.
  - 4. Give required notices.
  - 5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of required work.
  - 6. Promptly submit written notice to Consultant of observed variance of Contract Documents from legal requirements.
  - 7. Enforce strict discipline and good order among employees. Do not employ persons unskilled in assigned task.

1.5 WORK UNDER OTHER CONTRACTS

- A. Separate contracts may be issued to perform certain construction operations at the site. The contractor of this project will allow reasonable access and coordination to the other contractor/s.

1.6 WORK SEQUENCE

- A. The facility shall remain occupied and operational while work is in progress. All work shall be performed during normal business hours. Normal business hours are defined as 7:00 a.m. to 5:00 p.m. Monday thru Friday. Material and equipment deliveries shall be made during normal business hours.

1.7 CONTRACTOR USE OF PREMISES

- A. General: During the construction period, the contractor shall have full use of the premises for construction operations, including use of the site. The contractor's use of the premises is limited only the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.
- B. General: Limited use of the premises to construction activities in areas indicated within the limit of the premises. The Contractor may only use portion(s) of the site for storage or work areas only with prior approval from Orange County Project Manager.
  - 1. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
  - 2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
  - 3. Burial of Waste Materials: Do not dispose of organic and hazardous material on site, either by burial or by burning.
  - 4. Where appropriate, maintain the existing building in a watertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

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5. Confine construction operations to the areas permitted by the contract documents and other Owner directives.
6. Provide protection and safekeeping of material and equipment stored on premises.
7. Contractor will move any stored material and equipment, which interfere with operations of the Owner or other contractors at no additional cost to the Owner..
8. Comply with Owner's requirements for ingress and egress procedures, prohibitions against firearms, procedures for transportation of workers, safety and fire prevention requirements and all applicable pollution control requirements. Refer to the following reference requirements:
  - a) Orange County Safety and Health Manual  
<http://www.orangecountyfl.net/VendorServices/OrangeCountySafetyandHealthManual.aspx>
  - b) Orange County Policy Manual page 96 regarding Firearms  
<http://www.orangecountyfl.net/portals/0/resource%20library/employment%20-%20volunteerism/Policy%20Manual.pdf>
9. Contractor to require all employees and subcontractors to wear non-objectionable clothing; prohibit revealing clothing and articles of clothing with offensive writings displayed. The contractor shall require offending personnel to leave the premises until such clothing is changed.
10. Contractor employees and subcontractors will not fraternize with County employees or the general public during the entire construction period.
11. Use of sound equipment (such as boom boxes, stereos, radios, etc.) is not allowed.
12. Contractor and their personnel shall abide to Orange County Tobacco free policy while on any Orange County Convention Center property. This policy shall apply to building, parking lots, parks, break areas and worksites. Tobacco is defined as tobacco products, including but not limited to: Cigars, cigarettes, pipes, chewing tobacco and snuff. Failure to abide by the policy may result in civil penalties levied under Chapter 386, Florida Statutes and/or Contract enforcement remedies. Refer to the following documents:
  - a) Orange County Smoking Policy:  
<http://www.orangecountyfl.net/Portals/0/resource%20library/employment%20-%20volunteerism/Employee%20Handbook.pdf>
13. Conduct that is disrespectful, abusive or otherwise objectionable to the Owners' employees or general public will not be allowed at any time during the construction period. Repetitive complaints and violations of the requirements listed above will be cause for dismissal and or permanent removal of offending personnel from the project.
14. Contractor to coordinate with the Owner the site location for storage of equipment, machinery, materials, tools and a construction waste dumpster.
15. Contractor shall at all times keep the premises free of all waste or surplus materials, rubbish and debris, which is caused by contractor employees or subcontractors resulting from their work. Contractor shall maintain a safe work environment to all building occupants during the construction period.

1.8 SECURITY AND IDENTIFICATION

- A. The building shall be secured from unwarranted entry at the end of each workday.
- B. All costs for background investigations will be Contractor's responsibility. The County shall have the right to request any additional investigative background information including, but limited to, the employment record, Right-To-Know records, E-Verify system records (if the Contractor uses this service as a means to determine employment eligibility, available through [www.uscis.gov](http://www.uscis.gov)), training records, payroll records, position for which hired including site location of any personnel

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assigned to perform the services. The Contractor shall furnish, in writing, such information to the extent allowed by law, prior to commencement of services. The County reserves the right to conduct its own investigation of any employee of the Contractor.

- C. Background Checks for the contractor's staff must be approved by Orange County's Security team prior to working in any County facility. Contractors are responsible for obtaining the necessary forms for background checks for work at Orange County. All contractors' staff background checks will be sent to the Orange County Project Manager for approval.
- D. For security purposes and to maintain privacy, please submit a FDLE Background Checks via e-mail the subject line of the email must contain the following **\*\*\*EXEMPT\*\*\***
- E. Orange County will inform the contractor of their Background Check results. Upon Background Check approval, the contractor's staff shall arrange an appointment with the Orange County staff to obtain an Orange County photo ID badge. An affidavit of Identity form (issued by the contractor) and a State of Florida ID or Drivers License will be required.
- F. Contractor's employees will not be allowed in Orange County facilities without completed and approved background investigations.
- G. Work hours will be scheduled around business activity. Business activity is considered to be Orange County office/administrative staff located in or adjacent to construction/renovation site or Orange County Clients renting convention space located in or adjacent to construction/renovation site.
- H. Private Security Vendors:
  - 1. All non-escorted personnel (vendors and/or contractors) with access to any Orange County Sheriff's Office facility(s) will have a background check **AND** will be fingerprinted by a member of the Orange County Sheriff's Office, Facilities Security Section or designee, prior to the start of work. The vendor and/or contractor being checked must meet the Orange County Sheriff's Office, "Access Criteria". The final decision to grant or deny access to any Orange County Sheriff's Office Facility will come from the Facilities Security Section Lieutenant.
  - 2. The perpetration of any act that would constitute a felony or misdemeanor criminal offense, **whether criminally prosecuted or not**, will be reviewed and could be cause for disqualification. Multiple offenses of ANY crimes generally result in a recommendation to disqualify.

**VENDOR AND CONTRACTORS CRITERIA**

<b>CRIMES</b>	<b>FELONY</b>	<b>MISDEMEANOR</b>
WEAPONS RELATED	NO ACCESS	NO ACCESS
SEXUAL RELATED	NO ACCESS	NO ACCESS
FALSE STATEMENTS OR CRIMES OF MORAL TURPITUDE	NO ACCESS	NO ACCESS
DRUG SALES OR DISTRIBUTION	NO ACCESS	NO ACCESS
POSSESSION OF DRUGS	>5 YEARS = YES	>2 YEARS = YES
BATTERY	NO ACCESS	>5 YEARS = YES
ASSAULT	NO ACCESS	>5 YEARS = YES
THEFT	NO ACCESS	>5 YEARS = YES
ALCOHOL RELATED	NO ACCESS	>2 YEARS = YES
TRESPASSING	NO ACCESS	>2 YEARS = YES
RESISTING THE POLICE	NO ACCESS	>5 YEARS = YES

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**\*\*\* This list is not all inclusive \*\*\***

Requirements: Full name – first, last, and middle initial  
Complete social security number  
Driver's license number  
Date of birth

1.9 OWNER OCCUPANCY

- A. Owner Occupancy: The Owner will be occupying the building during construction. Normal occupancy hours are 7:00 a.m. to 5:00 p.m. Monday through Friday. The contractor is to coordinate with the Owner's representative for areas in the building that work can be performed on during normal business hours. Such placing of equipment and partial occupancy shall not constitute acceptance of the total work.
1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.
  2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
  3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.10 DISTRIBUTION OF RELATED DOCUMENTS

- A. The Contractor is solely responsible for the distribution of ALL related documents/drawings to ALL appropriate vendors/subcontractors to ensure proper coordination of all aspects of the project and its related parts during bidding and construction.

1.11 CONTRACT DOCUMENT FILE

- A. Copies of the Contract Documents, Plans, Specifications, Addenda, Change Orders, Engineers Supplemental Instructions, approved Shop Drawings, Substitution Acceptances, etc. shall be placed and maintained at the project site by the Contractor throughout the entire contract period. These said documents shall be filed in a manner that allows for ease of retrieval. Documents shall be made available to the Engineer and the County's representatives throughout this same period.

1.12 CONCURRENT MODERNIZATION WORK AND BUILDING OPERATION

- A. This project is a major elevator modernization in an existing building which is open for public business and will continue to operate throughout all phases of required work. It is essential that Contractor give special attention and priority to all matters concerning project safety, protection from dust and loose materials, reduction of noise level, protection from water and air infiltration into building, and maintenance of neat, slightly conditions in and around work areas inside and outside of building. Packaging, scrap materials, and demolition debris shall be promptly removed from building and site on a daily basis.
- B. At all times, Contractor shall provide clearly visible warning and directions signs, barricades, temporary lighting, overhead protection, and hazard-free walking surfaces throughout public areas. At all times, special attention must be given to building entrances, exits, and proper safe exiting through work areas as required by law.
- C. Contractor shall consult Owner and other Contractors to establish and maintain safe temporary routes including, but not limited to, proper barricades, walking surfaces, lighting, fire protection, exiting, warning and directional signs, and general protection of persons from all hazards in accordance with OSHA Standards due wholly or partially to its operations.

PART 2 - PRODUCTS

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2.1 ASBESTOS FREE MATERIAL

- A. Contractor shall provide a written and notarized statement on company letterhead(s) to certify and warrant that ONLY ASBESTOS FREE MATERIALS AND PRODUCTS were provided AS REQUIRED BY THE Engineer. Such statement shall be submitted with the final payment request. Final payment shall not be made until such statement is submitted. Contractor agrees that if materials containing asbestos are subsequently discovered at any future time to have been included in the construction, the Contractor shall be liable for all costs related to the redesign or modification of the construction of the project so that materials containing asbestos are removed from the facility. If construction has begun or has been completed pursuant to a design that includes asbestos containing materials, the Contractor shall also be liable for all costs related to the abatement of such asbestos.

PART 3 - EXECUTION (Not applicable).

END OF SECTION 01 11 00

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SECTION 01 25 00  
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling request for substitutions made during bidding and after award of the Contract.
- B. The Contractor's Installation Schedule and the Schedule of Submittals are included under Section "Submittal Procedures".

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: The Contract will be awarded based on the design, methods, materials and/or equipment as addressed in the Contract Drawings and/or described in the Contract Specifications, without any consideration for substitution or "or-equal" replacement. Addressing, describing or naming an item is intended to establish the type, function, characteristics and quality required in order to establish a base for bidding.
  - 1. Within thirty (30) days after Contract award, the Contractor may submit for approval substitutes for any equipment and/or material. In addition to the product documents, a written certification shall accompany the documentation indicating that the proposed substitute will have the same characteristics, will perform in accordance with the design requirements and that complies with all the requirements set for in the Contract. Any additional information required by the Owner or County Representative shall be provided by the Contractor. Rejection of any proposed substitute will be considered final and the Contractor shall not get into any agreement with manufacturers or providers until the submittal has been finally approved.
  - 2. The submission of this documentation shall follow the requirements set quality required in order to establish a base for bidding.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Request for substitution will be considered if received within thirty (30) days after contract award. As long as this time allowance will not impact the construction schedule.
  - 1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals. Refer to Section 01 25 00A – Substitution Request Form.
  - 2. Identify the product, or the fabrication or installation method to be replaced in

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each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitution, and the following information, as appropriate:

- a. Product Data, including Drawings, and descriptions of products, fabrication and installation procedures.
  - b. Samples, where applicable or requested.
  - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
  - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
  - e. A statement indicating the substitution's effect on the Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
  - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
  - g. Certification by the Contractor that the Substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
3. Engineer's Action: Within two weeks of receipt of the request for substitution, the Engineer will request additional information or documentation necessary for evaluation of the request if needed. Within two (2) weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the project specified by name. Decision on the use of a product substitution or its rejection by the Engineer is considered final. Acceptance will be in the form of a Change Order.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise request will be returned without action except to record noncompliance with these requirements.
1. Extensive revisions to Contract Documents are not required.
  2. Proposed changes are in keeping with the general intent of Contract Documents.
  3. The request is timely, fully documented and properly submitted.
  4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.

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5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  6. A substantial advantage is offered to the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar consideration.
  7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
  8. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
  9. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
- B. The Contractor's submittal and Project Manager's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- C. Substitution request constitutes a representation that the Contractor:
1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
  2. Will provide the same warranty for substitution as for specified product.
  3. Will coordinate installation and make other changes which may be required for work to be complete in all respects.
  4. Waives claims for additional costs which may subsequently become apparent. All costs associated with the substitution will be paid by the Contractor regardless of approvals given, and regardless of subsequent difficulties experienced as a result of substitutions.

END OF SECTION 01 25 00



**SUBSTITUTION REQUEST FORM**

PROJECT: \_\_\_\_\_

TO: \_\_\_\_\_

DATE: \_\_\_\_\_

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Division 01 Section "Substitution Procedures:"

**1. SPECIFIED PRODUCT OR SYSTEM**

Substitution request for: \_\_\_\_\_

Specification Section No.: \_\_\_\_\_

Article/Paragraph: \_\_\_\_\_

**2. REASON FOR SUBSTITUTION REQUEST**

SPECIFIED PRODUCT:

- Is no longer available.
- Is unable to meet project schedule.
- Is unsuitable for the designated application.
- Cannot interface with adjacent materials.
- Is not compatible with adjacent materials.
- Cannot provide the specified warranty.
- Cannot be constructed as indicated
- Cannot be obtained due to one or more of the following:
  - Strike
  - Lockout

PROPOSED PRODUCT:

- Will reduce construction time
- Will result in cost savings of \$\_\_\_\_\_ to the Project
- Is for supplier's convenience
- Is for subcontractor's convenience
- Other: \_\_\_\_\_
- Bankruptcy of Manufacturer or Supplier
- Similar occurrence

**3. SUPPORTING DATA**

- Drawings, specifications, product data, performance data, test data, and any other necessary information to facilitate review of the Substitution Request is attached.
- Sample is attached.
- Sample will be sent if requested.

**4. QUALITY COMPARISON**

Provide all necessary side-by-side comparative data as required to facilitate review of Substitution Request:

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SPECIFIED PRODUCT

PROPOSED PRODUCT

Manufacturer: \_\_\_\_\_  
Name / Brand: \_\_\_\_\_  
Catalog No.: \_\_\_\_\_  
Vendor: \_\_\_\_\_  
Variations: \_\_\_\_\_

Additional Information for Proposed Project as follows:

Local Distributor or Supplier: \_\_\_\_\_

Maintenance Service Available:  Yes  No

Spare Parts Source: \_\_\_\_\_

Warranty:  Yes  No \_\_\_\_\_ Years

**5. PREVIOUS INSTALLATIONS**

Identification of at least two (2) similar projects on which proposed substitution was used:

PROJECT #1:

Project: \_\_\_\_\_

Address: \_\_\_\_\_

Engineer: \_\_\_\_\_

Owner: \_\_\_\_\_

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

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

PROJECT #2:

Project: \_\_\_\_\_

Address: \_\_\_\_\_

Engineer: \_\_\_\_\_

Owner: \_\_\_\_\_

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

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

**6. EFFECT OF SUBSTITUTION**

Proposed substitution affects other work or trades:  No  Yes (if yes, explain)

Proposed substitution requires dimensional revisions or redesign of architectural, structural, M-E-P, life safety, or other work:  No  Yes (if yes, attach data explaining revisions)

**7. STATEMENT OF CONFORMANCE TO CONTRACT REQUIREMENTS**

Contractor and Subcontractor have investigated the proposed substitution and hereby represent that:

- A. They have personally investigated the proposed substitution and believe that it is equal to or superior in all respects to specified product, except as stated above;
- B. The proposed substitution is in compliance with applicable codes and ordinances;
- C. The proposed substitution will provide same warranty as specified for specified product;
- D. They will coordinate the incorporation of the proposed substitution into the Work, and will include modifications to the Work as required to fully integrate the substitution;
- E. They have included complete cost data and implications of the substitution (attached);
- F. They will pay any redesign fees incurred by the Engineer or any of the Engineer's consultants, and any special inspection costs incurred by the Owner, caused by the use of this product;
- G. They waive all future claims for added cost or time to the Contract related to the substitution, or that become known after substitution is accepted.
- H. The Engineer's approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Engineer at the time decision is rendered and Addendum is issued; and that Engineer's approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

Contractor: \_\_\_\_\_  
(Name of Contractor)

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

Subcontractor: \_\_\_\_\_  
(Name of Subcontractor)

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

**Note: Unresponsive or incomplete requests will be rejected and returned without review.**

**8. ENGINEER'S REVIEW AND ACTION**

Substitution is accepted.

Substitution is accepted, with the following comments: \_\_\_\_\_

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

Resubmit Substitution Request:

Provide more information in the following areas: \_\_\_\_\_

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

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- Provide proposal indicating amount of savings / credit to Owner
- Bidding Contractor shall sign Bidder's Statement of Conformance
- Bidding Subcontractor shall sign Bidder's Statement of Conformance
- Substitution is not accepted:
  - Substitution Request received directly from subcontractor or supplier.
  - Substitution Request not submitted in accordance with requirements.
  - Substitution Request Form is not properly executed.
  - Substitution Request does not indicate what item is being proposed.
  - Insufficient information submitted to facilitate proper evaluation.
  - Proposed product does not appear to comply with specified requirements.
  - Proposed product will require substantial revisions to Contract Documents.

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

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

Engineer has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the specified product.

**9. OWNER'S REVIEW AND ACTION**

- Substitution is accepted; Architect to prepare Change Order.
- Substitution is not accepted.

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

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

*(Owner's Representative)*

**END OF SECTION 01 25 00A**

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SECTION 01 26 00  
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections: The following sections contain requirements that relate to this section:
  - 1. Division 01 Section 01 25 00 Substitution Procedures for administrative procedures for handling requests for substitutions made after award of the Contract.
  - 2. Division 01 Section 01 29 00 Payment Procedures for administrative procedures governing applications for payment.
  - 3. Division 01 Section 01 33 00 Submittals for requirements for the Contractor's Construction Schedule.

1.3 MINOR CHANGES IN THE WORK

- A. Supplemental instructions authorizing minor changes in the work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Project Manager.

1.4 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in the work that will require adjustment to the Contract Sum or Contract Time will be issued by the Project Manager, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
  - 1. Proposal requests issued by the Project Manager are for information only. Do not consider them instruction either to stop work in progress, or to execute the proposed change.
  - 2. Unless otherwise indicated in the proposal request, within 7 days of receipt of the proposal request, submit to the Project Manager from the Owner's review, an estimate of cost necessary to execute the proposed change.
    - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include a statement indicating the effect the proposed change in the work will have on the Contract Time.
    - d. Contractor and subcontractors will provide a complete detailed labor and material breakdown to justify change order request amount.

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- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions in mutual accord with the Owner Representatives findings require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Engineer.
  - 1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
  - 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Comply with requirements in Section 01 25 00 "Substitution Procedures" - if the proposed change in the work requires that substitution of one product or system for a product or system not specified.
  - 5. Contractor and subcontractors will provide a complete detailed labor and material breakdown to justify change order request amounts.
- C. Proposal Request Form: Project Manager will transfer the information to the appropriate forms for approval. Use AIA Document G 709 for Change Order Proposal Requests.
- D. Proposal Request Form: Use forms provided by the Owner for Change Order Proposals.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Project Manager may issue a Construction Change Directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Project Manager will issue a Change Order for signatures of the Owner and Contractor on County's Change Order form, as provided in the Conditions of the Contract.

PART 2- PRODUCTS (Not Applicable)  
PART 3- EXECUTION (Not Applicable)

END OF SECTION 01 26 00

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SECTION 01 29 00  
PAYMENT PROCEDURES

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
- B. The Contractor's Construction Schedule and Submittal Schedule are included in Section 01 33 00 – "SUBMITTAL PROCEDURES".

1.3 SCHEDULE OF VALUES

- A. Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Submit the Schedule of Values to the Owner at the earliest feasible date, but in no case later than Preconstruction Meeting.
  - 2. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
  - 1. Identification: I nclude the following project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of the Engineer
    - c. Project Number
    - d. Contractor's name and address
    - e. Date of submittal
  - 2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
    - a. Generic name
    - b. Related Specification Section
    - c. Change Orders (numbers) that have affected value
    - d. Dollar Value
    - e. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent
  - 3. Provide a br eakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items:

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- a. A value will be given for at least every major specification section (subsections can logically be grouped together).
  - b. A single material subcontractor will not be required to be broken down into labor and material unless it is anticipated the materials will be stored and invoiced prior to installation.
  - c. All multiple item subcontracts or work items (i.e. mechanical, electrical items, etc.) will be shown broken down at least in labor and material (all taxes, burden and overhead and profit included).
  - d. Mobilization (move-on, bond, insurance, temporary office and sanitary service installation) shall not exceed 2 1/2% of contract price.
  - e. For multi-story work all items broken down per floor.
  - f. HVAC: Typically shown per specification section, labor and material, per floor.
  - g. Electrical: same as HVAC.
  - h. Logical grouping of specification subsections are permitted.
4. Round amounts off the nearest whole dollar, the total shall equal the Contract Sum.
  5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
    - a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
  7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the contract sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as reviewed by the Owner's representative and paid for by the Owner.
  1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the Final Application for Payment involve additional requirements. See items G, I, J and K of this section.
- B. Payment Application Times: The period of construction work covered by each Application of Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use the County's most updated form as the form for Application for Payment. Form given at the Preconstruction Conference.
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.



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1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
  2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Transmittal: Submit four (4) original executed copies of each Application for Payment to the Project Manager by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.
1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Project Manager.
- F. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors of sub-subcontractors and suppliers for the construction period covered by the previous application.
1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. The Owner reserves the right to designate which entities involved in the work must submit waivers.
  4. List all Subcontractor's start and finish dates to substantiate any Notice to Owner received by the Project Manager.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
1. List of principal subcontractors
  2. List of principal suppliers and fabricators
  3. Schedule of Values
  4. Approved Contractor's Construction Schedule (preliminary if not final)
  5. Schedule of principal products
  6. Schedule of unit prices (if applicable)
  7. Submittal schedule (preliminary if not final)
  8. List of Contractor's staff assignments
  9. List of Contractor's principal consultants
  10. Copies of building permits for trades requiring separate permits
  11. Copies of authorizations and licenses from governing authorities for performance of the Work
  12. Initial progress report
  13. Report of Pre-construction Meeting
  14. Initial settlement survey and damage report, (if required)
  15. Listing of all long lead procurement items monthly applications for payment will be accompanied with updated schedule and review of as-built drawings
- H. Interim Application for Payment: Payment will be processed once a month. No applications will be processed without receipt of previous months waiver of lien described in subsection F above. Payment for item will be based on percentage completed as determined and approved by the County Project Manager or invoice for stored materials. Retainage (5%) will be held for all interim applications.
- I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner

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occupancy of designated portions of the Work. Application shall also include all items listed in Part H. above.

J. Administrative actions and submittals that shall proceed or coincide with Substantial Completion Payment. Substantial Completion as defined per General Conditions Section "F" application include:

1. Occupancy permits and similar approvals
2. Warranties (guarantees) and maintenance agreements
3. Test/adjust/balance records
4. Maintenance instructions
5. Start-up performance reports
6. Change-over information related to Owner's occupancy, use, operation and maintenance
7. Final cleaning
8. Application for reduction of retainage, and consent of surety
9. List of incomplete Work, recognized as exceptions to Project Manager's Certificate of Substantial Completion

K. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment. Application for Payment includes the following:

1. Completion of Project Close-Out requirements
2. Completion of items specified for completion after Substantial Completion
3. Assurance that unsettled claims will be settled
4. Assurance that all work has been completed and accepted
5. Proof that taxes, fees and similar obligations have been paid
6. Removal of temporary facilities and services
7. Removal of surplus materials, rubbish and similar elements
8. Change of door locks to Owner's access
9. Submission of all close-out documents. Refer to Section 01 77 00.

PART 2- PRODUCTS (Not Applicable)

PART 3- EXECUTION (Not Applicable)

END OF SECTION 01 29 00

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SECTION 01 31 00  
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.0 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for project coordination including, but not necessarily limited to:
  - 1. Coordination
  - 2. Administrative and supervisory personnel
  - 3. General installation provisions
  - 4. Cleaning and protection
- B. Progress meetings, coordination meetings and Pre-installation conferences are included in Section 01 31 19 "Project Meetings".
- C. Requirements for the Contractor's Construction Schedule are included in Section 01 33 00 "Submittal Procedures".

1.3 COORDINATION

- A. Coordination: Coordinate construction activities included under various Sections of these Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specification that are dependent upon each other for proper installation, connection, and operation.
  - 1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
  - 2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required: notices, reports, and attendance at meetings.
  - 1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Schedules
  - 2. Installation and removal of temporary facilities
  - 3. Delivery and processing of submittals

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4. Progress meetings
  5. Project close-out activities
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment (if any) involved in performance of, but not actually incorporated in, the Work.
- E. Lack of coordination as specified in this and other sections of the contract documents are in grounds for assessment of back charges and/or termination in order to remediate the situation.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
1. Show the interrelationship of components shown on separate Shop Drawings.
  2. Indicate required installation sequences.
  3. Comply with requirements contained in Section "Submittals".
- B. Staff Names: At the Preconstruction Conference submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
1. Post copies of the list in the project meeting room, the temporary field office, and each temporary telephone.

PART 2 - ELEVATOR CONTRACTOR INFORMATION

2.1 APPLICABLE CODES

- A. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following Codes, laws, and/or Authorities, including revisions and changes in effect:
1. Safety Code for Elevators and Escalators, ASME A17.1
  2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2
  3. Elevator and Escalator Electrical Equipment, ASME A17.5
  4. National Electrical Code, NFPA 70
  5. Americans with Disabilities Act, ADA and Florida Accessibility Codes
  6. Local Fire Authority
  7. Requirements of most stringent provision of local applicable building code.
  8. Life Safety Code, NFPA 101
  9. Uniform Federal Accessibility Standard, UFAS
  10. 2014 Florida Building Code: Accessibility

2.2 STAGING AREA

- A. See drawings and plans.

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2.3 WORK PHASE

- A. Perform work by removing only one elevator from service at a time with the exception for testing and interfacing purposes which shall be performed during afterhours per the Owner's approval.

2.4 OCCUPANCY AND WORK BY OTHERS

- A. Contractor expressly affirms Owner's rights to let other contracts and employ other Contractors in connection with required work. Contractor will afford other Contractors and their workmen reasonable opportunity for introduction and storage of materials and equipment, for execution of their work, and will properly connect and coordinate its work with theirs. Contractor will also incorporate comparable provisions in all its subcontracts.
- B. Contractor declares that other Contractors employed by Owner on basis of separate contracts may proceed at such times as necessary to install items of work required by Owner.
- C. Contractor declares that it will cooperate with other Contractors employed by Owner and, in addition to other coordination and expediting efforts, will coordinate their work by written notices regarding necessity of such work to be done on or before certain dates.
- D. Contractor declares that it is responsible for review, stamped, and signed approval of all shop drawings for required work.
- E. Contractor hereby declares that content of foregoing paragraphs and influence they may have on project:
  - 1. Shall not cause a change in stipulated Contract Sum
  - 2. Shall not cause a change in Construction Time Schedule

PART 3- EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to Project Manager for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the

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best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Project Manager for final decision.

3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as directed by the Project Manager and as frequently as necessary to ensure its integrity and safety through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where the applicable, such exposures include, but are not limited to, the following:
  - 1. Excessive static or dynamic loading
  - 2. Excessively high or low temperatures
  - 3. Excessively high or low humidity
  - 4. Air contamination or pollution
  - 5. Water
  - 6. Solvents
  - 7. Chemicals
  - 8. Soiling, staining and corrosion
  - 9. Rodent and insect infestation
  - 10. Combustion
  - 11. Destructive testing
  - 12. Misalignment
  - 13. Excessive weathering
  - 14. Unprotected storage
  - 15. Improper shipping or handling
  - 16. Theft
  - 17. Vandalism

END OF SECTION 01 31 00

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SECTION 01 31 19  
PROJECT MEETINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction Conference
  - 2. Pre-Installation Conference
  - 3. Coordination Meetings
  - 4. Progress Meetings
- B. Construction schedules are specified in Section 01 33 00 - Submittal Procedures.

1.3 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference and organizational meeting at the project site or other convenient location no later than 20 days after execution of the agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attends: The County's Representative, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative construction schedule
  - 2. Critical Work sequencing and/coordinating
  - 3. Designation of responsible personnel
  - 4. Procedures for processing field decisions and Change Orders
  - 5. Procedures for processing Applications for Payment
  - 6. Distribution of Contract Documents
  - 7. Submittal of Shop Drawings, Product Data and Samples
  - 8. Preparation of record documents
  - 9. Use of the Premises
  - 10. Office, Work and storage areas
  - 11. Equipment deliveries and priorities
  - 12. Safety procedures
  - 13. First aid
  - 14. Security
  - 15. Housekeeping
  - 16. Working hours
- D. Contractor must submit at the time of the meeting at least the following items:
  - 1. Schedule of Values

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2. Listing of key personnel including project superintendent and subcontractors with their addresses, telephone numbers, and emergency telephone numbers.
3. Preliminary Construction Schedule
4. Submittal Schedule

1.4 PRE-INSTALLATION CONFERENCE

- A. Conduct a Pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise at least 48 hours in advance the Project Manager of scheduled meeting dates.
  1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
    - a. Contract Documents
    - b. Options
    - c. Related Change Orders
    - d. Purchases
    - e. Deliveries
    - f. Shop Drawings, Product Data and Quality Control Samples
    - g. Possible conflicts
    - h. Compatibility problems
    - i. Time schedules
    - j. Weather limitations
    - k. Manufacturer's recommendations
    - l. Comparability of materials
    - m. Acceptability of substrates
    - n. Temporary facilities
    - o. Space and access limitations
    - p. Governing regulations
    - q. Safety
    - r. Inspection and testing requirements
    - s. Required performance results
    - t. Recording requirements
    - u. Protection
  2. Record significant discussions and agreements and disagreements of each conference along with and approved schedule. Distribute the record of the meeting to everyone concerned promptly including the Owner and Engineer.
  3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 COORDINATION MEETINGS

- A. Conduct project coordination meeting at weekly intervals on day and time as established by the Project Manager or more frequently, if necessary convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved, to include subcontractors and



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representatives.

- C. Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project site at bimonthly intervals or more frequently if necessary as directed by the Project Manager. Notify the Owner at least 48 hours in advance of scheduled meeting time and dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress of involved in planning, coordination or performance of future activities with the project and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
  - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time, ahead, or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
  - 2. Review the present and future needs of each entity present, including such items as:
    - a. Interface requirements
    - b. Time
    - c. Sequences
    - d. Deliveries
    - e. Off-site fabrication problems
    - f. Access
    - g. Site utilization
    - h. Temporary facilities and services
    - i. Hours of work
    - j. Hazards and risks
    - k. Housekeeping
    - l. Quality and work standards
    - m. Change Orders
    - n. Documentation of information for payment requests.
- D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, or progress since the previous meeting and report.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 19

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SECTION 01 33 00  
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:

1. Contractor's Construction Schedule
2. Submittal Schedule
3. Daily Construction Reports
4. Shop Drawings
5. Product Data
6. Samples

- B. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits
2. Applications for Payment
3. Performance and Payment Bonds
4. Insurance Certificates
5. List of Subcontractors with start and finish dates (update as necessary)
6. Schedule of Values
7. Construction Schedule

- C. The Schedule of Values submittal is included in Section 01 29 00 "Payment Procedures".

1.3 ELECTRONIC SUBMITTAL PROCEDURES

- A. General: Submittals shall be submitted electronically directly to the Engineer from the General/Mechanical/Electrical Contractor.

1. **All shop drawings and other submittals as specified herein, shall be submitted in electronic format.** All electronic CAD generated drawings shall be in Acrobat PDF format and all product data or other information shall be submitted in Acrobat PDF format. Coordinate with Engineer prior to submitting. All electronic submittals shall be posted to the Engineer's FTP site. Information regarding the username and password shall be distributed to all parties prior to the pre-construction meeting.

- B. Electronic copies of CAD drawings made from the Construction/Contract Documents will not be provided by Engineer without a written indemnification. Indemnification form will be provided by the Engineer at Pre-Construction Meeting to the General/Mechanical/Electrical Contractor upon written request.

- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

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1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
  2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. The Project Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
    - a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Project Manager will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
    - b. If an intermediate submittal is necessary, process the same as the initial submittal.
    - c. Allow two weeks for reprocessing each submittal.
    - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
  3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Engineer.
    - d. Name and address of Contractor.
    - e. Name and address of subcontractor.
    - f. Name and address of supplier.
    - g. Name of manufacturer.
    - h. Submittal number or other unique identifier, including revision identifier.
      - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 233300.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 233300.01.A).
      - 2) Where multiple products are shown, highlight/circle or identify product intended to be used
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.

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- E. Contractor shall be responsible for cost of re-review of rejected submittals, shop drawing, etc. Costs for re-review shall be reimbursed to the County by deducting the cost from the Contractors monthly progress payments. Costs to be determined by applying the consultants standard billing rates, plus 10% handling by the County.
- F. Substitution request to specified products will be made within 30 days of Notice to Proceed. After the 30 day period, no requests for substitutions from the Contractor will be considered.
  - 1. Substitution submitted within the first 30 days will have product data from specified and requested substitute submitted together and demonstrate better quality, cost savings if of equal quality, or show benefit to the County for excepting the substitute.
- G. Once electronic submittals are approved or approved as noted, they will be transmitted to the owner.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Critical Path Method (CPM) Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule.
  - 1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the Schedule of Values.
  - 2. Within each time bar, indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.
  - 3. Prepare the schedule on a sheet, series of sheets, stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
  - 4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work.
  - 5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment request and other schedules.
  - 6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Engineer's procedures necessary for certification of Substantial Completion.
- B. Phasing: Provide notations on the schedule to show how the sequence of the work is affected by requirements for phased completion to permit work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.
- C. Work Stages: Indicate important stages of construction for each major portion of the work, including testing and installation.
- D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the work. Indicate where each element in an area must be sequenced or integrated with other activities.
- E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating precalculated and actual costs. On the line show dollar-volume of work performed as the dates used for preparation of payment requests.

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1. Refer to Section Applications for Payment for cost reporting and payment procedures.
- F. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the project meeting room and temporary field office.
  1. When revision are made distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- G. Schedule Updating: Revise the schedule monthly or activity, where revisions have been recognized or made. Issue the updated schedule concurrently monthly pay request.

1.5 SUBMITTAL LOG

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete log of submittals.
  1. Coordinate submittals log with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
  2. Prepare the log in chronological order; include all submittals required. Provide the following information:
    - a. Scheduled date for the first submittal
    - b. Related Section number
    - c. Submittal category
    - d. Name of subcontractor
    - e. Description of the part of the work covered
    - f. Scheduled date for resubmittal
    - g. Scheduled date for the Engineer's final release or approval.
  3. All submittals must be received within the first 25% of contract time.
- B. Distribution: Following response to initial submittal, print and distribute copies to the Project Manager, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.
  1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Log Updating: Revise the log after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Project Manager at weekly intervals:
  1. List of subcontractors at the site
  2. Approximate count of personnel at the site
  3. High and low temperatures, general weather conditions
  4. Accidents and unusual events

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5. Meetings and significant decisions
6. Stoppages, delays, shortages, losses
7. Meter readings and similar recordings
8. Emergency procedures
9. Orders and requests of governing authorities
10. Change Orders received, implemented
11. Services connected, disconnected
12. Equipment or system tests and start-ups
13. Partial completions, occupancies
14. Substantial Completions authorized

1.7 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered a Shop Drawings and will be rejected.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
  1. All required dimensions
  2. Identification of products and materials included
  3. Compliance with specified standards
  4. Notation of coordination requirements
  5. Notation of dimensions established by field measurement
  6. Sheet Size: Except for templates, patterns and similar full-size Drawings on sheets at least 8" x 11" but no larger than 24" x 36".
  7. Number of Copies: Submit one (1) electronic copy of each submittal to the County's Representative, unless copies are required for operation and maintenance manuals. Submit one (1) electronic copy where copies are required for operation and maintenance manuals. Engineer will retain 1 electronic copy. Mark up and retain one returned electronic copy as a Project Record Drawing.
  8. Submit one (1) hard copy once approved for legal seal stamping if needed at jobsite. Coordinate with Engineer and County's Representative.
  9. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connections with construction.
- C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
  1. Preparation of coordination Drawings is specified in section Project Coordination and may include components previously shown in detail on Shop Drawings or Product Data.
  2. Submit coordination Drawings for integration of different construction elements. Show sequence and relationships of separate components to avoid any conflict including conflicts in use of space.
  3. Contractor is not entitled to additional payments due to lack of compliance with this Section.

1.8 PRODUCT DATA

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- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawing".
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
    - a. Manufacturer's printed recommendations
    - b. Compliance with recognized trade association standards
    - c. Compliance with recognized testing agency standards
    - d. Application of testing agency labels and seals
    - e. Notation of dimensions verified by field measurement
    - f. Notation of coordination requirements
    - g. Manufacturer's local representative and phone number.
  2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
  3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
  4. Submittals: Submit six (6) copies of each required submittal. The Project Manager will return two (2) sets to the Contractor marked with action taken and corrections or modifications required.
    - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
  5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
    - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the Installer's possession.
    - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.9 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of materials, color range sets, and swatches showing color, texture and pattern.
1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Engineer's/Owner's Sample. Include the following:
    - a. Generic description of the Sample
    - b. Sample source
    - c. Product name or name of manufacturer
    - d. Compliance with recognized standards
    - e. Availability and delivery time
  2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these

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characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
  - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
- a. Preliminary submittals will be reviewed and returned with the Engineer's/Owner's mark indicating selection and other action.
4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
5. Maintain sets of Samples, as returned, at the project site, for quality comparisons throughout the course of construction.
- a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
  - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field Samples specified in individual sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.
    - a. Comply with submittal requirements. Process transmittal forms to provide a record of activity.

1.10 ENGINEER'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Project Manager will review each submittal, mark to indicate action taken, and return promptly.
  1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Engineer/Project Manager will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, similarly as follows, to indicate the action taken:
  1. Final Unrestricted Release: Where submittals are marked No Exceptions Taken, that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.



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2. Final-But-Restricted Release: When submittals are marked Made Corrections Noted that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
3. Returned for Resubmittal: When submittal is marked Revise and Resubmit, do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
  - a. Do not permit submittals marked Revise and Resubmit to be used at the Project site, or elsewhere where work is in progress.
4. Rejected: Submittal does not comply with requirements of the Contract Documents. Submittal must be discarded and entirely new submittal shall be forward to the Project Manager without delay.

1.11 ELEVATOR CONTRATOR

A. SUBMITTALS

1. ALL ELEVATOR SUBMITTALS MUST BE SUBMITTED AT ONE TIME. NO PHASED SUBMITTALS WILL BE REVIEWED OR ACCEPTED.
  2. Within 30 calendar days after award of contract and before beginning equipment fabrication, submit shop drawings, and required material samples for review.
  3. Scaled or Fully Dimensioned Layout: Plan of pit, hoistway, and machine room indicating equipment arrangement, and car/hall signal fixtures.
  4. Design Information: Indicate equipment lists, reactions, and design information on layouts.
  5. Power Confirmation Information: Design for existing conditions.
  6. Fixtures: Cuts, samples, or shop drawings.
  7. Finish Material: Submit 3" x 12" samples of actual finished material for review of color, pattern, and texture. Compliance with other requirements is the exclusive responsibility of the Contractor. Include, if requested, signal fixtures, lights, graphics, Braille plates, and detail of mounting provisions.
  8. Design Information: Provide calculations verifying the following:
    - a. Adequacy of existing electrical provisions.
    - b. Machine room heat emissions in B.T.U.
    - c. Adequacy of existing car platform structure for intended loading.
    - d. Adequacy of plunger wall thickness for intended loading.
  9. Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.
- B. Submittal review shall not be construed as an indication that submittal is correct or suitable, or that the work represented by submittal complies with the Contract Documents. Compliance with Contract Documents, code requirements, dimensions, fit, and interface with other work is Contractor's responsibility.
- C. Acknowledge and/or respond to review comments within 14 calendar days of return. Promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Identify and cloud drawing

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revisions, including Contractor elective revisions on each re-submittal. Contractor's revision response time is not justification for equipment delivery or installation delay.

PART 2 - PRODUCTS (Not Applicable)

PART 3- EXECUTION (Not Applicable)

END OF SECTION 01 33 00

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SECTION 01 65 00  
PRODUCT DELIVERY AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.01 SITE CONDITION INSPECTION

- A. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
- B. Do not proceed with installation until work in place conforms to project requirements.

1.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in Contractor's original, unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
- C. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.
- D. Allocate available site storage areas and coordinate their use with Owner and other Contractors.
- E. Provide suitable temporary weather-tight storage facilities as may be required for materials which will be stored in the open.

1.03 INSTALLATION REQUIREMENTS

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install machine room equipment with clearances in accordance with referenced codes and specification.
- C. Install all equipment so it may be easily removed for maintenance and repair.
- D. Install all equipment for ease of maintenance.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- F. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
  - 1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
  - 2. Machine room equipment, and pit equipment.
  - 3. Hoistway equipment including guide rails, guide rail brackets, and pit equipment.
  - 4. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

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1.04 MANUFACTURER'S NAMEPLATES

- A. Manufacturer's name plates and other identifying markings shall not be affixed on surfaces exposed to public view. This requirement does not apply to Underwriter's Laboratories and code required labels.
- B. Each major component of mechanical and electrical equipment shall have identification plate with the Manufacturer's name, address, model number, rating, and any other information required by governing codes.

1.05 COLORS OF FACTORY-FINISHED EQUIPMENT

- A. All colors will be selected from the Manufacturer's standard range unless custom colors are specified herein.
- B. Submit samples of all standard colors available and/or specified custom colors for review and approval. See Section 01 33 00, Submittals
- C. Submit samples of all specified architectural metals specified for review and approval. See Section 01 33 00, Submittals.

1.06 MATERIALS AND FINISHES

- A. Steel:
  - 1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
  - 2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
  - 3. Structural Steel Shapes and Plates: ASTM A36.
- B. Stainless Steel: Type 316 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.
  - 1. No. 4 Satin: Directional polish finish. Graining directions in vertical dimension.
- C. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- D. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with local authorities for elevator finish materials.
- E. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
  - 1. Paint Black: Pit channel, buffers, counterweight guards, cross head, machine block up beams.
  - 2. Paint Grey: Pit floor, machine room floor, car top, counterweights, counterweight frames.
  - 3. Paint Blue: Machine, motor
  - 4. Paint White: Machine room walls, machine room railings.
  - 5. Patch/Paint any area in which was damaged during project to return to condition prior to modernization work.

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- F. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.

END OF SECTION 01 65 00

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SECTION 01 73 29  
CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division-23 and Division-26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
  - 3. List products to be used and firms or entities that will perform Work.
  - 4. Indicate dates when cutting and patching is to be performed.
  - 5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
  - 6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
  - 7. Approval by the Engineer to proceed with cutting and patching does not waive the Engineer's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load carrying capacity or load-deflection ratio.
  - 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements.
    - a. Foundation construction
    - b. Bearing and retaining walls
    - c. Structural concrete

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- d. Structural steel
  - e. Lintels
  - f. Timber and primary wood framing
  - g. Structural decking
  - h. Miscellaneous structural metals
  - i. Stair systems
  - j. Exterior curtain wall construction
  - k. Equipment supports
  - l. Piping, ductwork, vessels and equipment
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety. Refer to Divisions 23 and 26 regarding Fire Rated Penetrations.
- 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems.
    - a. Shoring, bracing and sheeting
    - b. Primary operational systems and equipment
    - c. Air or smoke barriers
    - d. Water, moisture, or vapor barriers
    - e. Membranes and flashings
    - f. Fire protection systems
    - g. Noise and vibration control elements and systems
    - h. Control systems
    - i. Communication systems
    - j. Conveying systems
    - k. Electrical wiring systems
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.
- 1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:
    - a. Processed concrete finishes
    - b. Preformed metal panels
    - c. Window wall system
    - d. Stucco and ornamental plaster
    - e. Acoustical ceilings
    - f. Carpeting
    - g. Wall covering
    - h. HVAC enclosures, cabinets or covers
    - i. Roofing systems

PART 2- PRODUCTS

2.1 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect unless otherwise

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indicated by Engineer/Owner. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3- EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
  - 1. Before proceeding, meet at the site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas and interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or diamond core drill.
  - 4. Comply with requirements of applicable Sections of Division 02 where cutting and patching required excavating and backfilling.
  - 5. By-pass utility services such as pipe or conduit, before cutting, where services are



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shown or required to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.

- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials if necessary to achieve uniform color and appearance.
    - a. Where patching occurs in a smooth painted surfaces, extend final coat over entire unbroken surfaces containing the patch, after the patched area has received primer and second coat.

3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged materials to their original condition.

END OF SECTION 01 73 29

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SECTION 01 77 00  
CLOSEOUT PROCEDURES

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project close-out, including but not limited to:
1. Inspection procedures
  2. Project record document submittal. (substantial completion requirements)
  3. Operating and Maintenance Manual Submittal (substantial completion requirements).
  4. Submittal of warranties (substantial completion requirement).
  5. Final cleaning
- B. Final Payment to be made when the County has reviewed and accepted all required close-out documents.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for Certification of Substantial Completion, complete the following: List exceptions in the request.
1. In the Application for Payment that coincided with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.
  2. Advise Owner of pending insurance change-over requirements.
  3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
  4. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
  5. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Project Manager will either proceed with inspection or advise the Contractor of unfilled requirements. The Project Manager will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. Results of the completed inspection will form the basis of requirements for final acceptance.

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2. Should the project fail to meet the standards required for Substantial Completion as defined in the documents, the Contractor will pay the expense of a second inspection by the Engineer and the Owner. Cost will be deducted from the Contractor's retainage.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following list exceptions in the request:
  1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and complete operations where required.
  2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
  3. Submit a certified copy of the Engineer or Owner's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Project Manager.
  4. Submit final meter readings for utilities, a measured record of stored fuel and similar data as of the date of Substantial Completion, or when the Owner took possession of the responsibility for corresponding elements of the Work.
  5. Submit consent of surety to final payment.
  6. Submit a final liquidated damages settlement statement
  7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection Procedure: The Engineer will reinspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.
  1. Upon completion of reinspection, the Engineer will prepare a certification of final acceptance, or advise the contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

1.5 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposed; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation; where the installation varies substantially from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the
- C. Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Provide for project photographs if deemed necessary by Owner's representative.
  1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the work.
  2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
  3. Note related Change Order numbers where applicable.

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4. **Submit one (1) hardcopy of the most current record set of drawings when the project is considered 50% substantially complete for review and comment by Owner.**
  5. Organize record drawing sheets, and print. suitable titles, dates and other identification on the cover of each set.
  6. Provide three (3) additional sets of black line drawing sets of As-Built Drawings.
  7. Provide one (1) CD-ROM with all As-Built Drawings in AutoCAD and PDF format.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual work performed in comparison with the text of the specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Project Data.
1. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.
- D. Record Project Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variation in actual work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.
1. Upon completion of mark-up, submit complete set of record Product Data in the three ring binder (indexed) to the Engineer for the Owner's records.
- E. Record Sample Submitted: Immediately prior to the date or dates of substantial completion, the Contractor will meet at the site with the Engineer and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to the date or dates of substantial completion, complete miscellaneous record and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Project Manager for the Owner's records.
- G. Maintenance Manuals: Organize operating and maintenance data into four (4) suitable sets of manageable size and electronically as PDFs on one (1) CD-ROM compact disc. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions
  2. Spare parts list
  3. Copies of warranties
  4. Wiring diagrams
  5. Recommended turn-around cycles
  6. Inspection procedures
  7. Shop Drawings and Product Data

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8. Fixture lamping schedule

1.6 ELEVATOR FINAL OBSERVATIONS AND REVIEW REQUIREMENTS

- A. Review procedure shall apply for individual elevators, portions of groups of elevators and completed groups of elevators accepted on an interim basis, or elevators and groups of elevators completed, accepted, and placed in operation.
- B. Contractor shall perform review and evaluation of all aspects of its work prior to requesting Consultant's final review. Work shall be considered ready for Consultant's final contract compliance review when all Contractor's tests are complete and all elements of work or a designated portion thereof are in place and elevator or group of elevators are deemed ready for service as intended.
- C. Furnish labor, materials, and equipment necessary for Consultant's review. Notify Consultant five (5) working days in advance when ready for final review of elevator or group of elevators.
- D. Consultant's written list of observed deficiencies of materials, equipment, and operating systems will be submitted to Contractor for corrective action. Consultant's review shall include as a minimum:
  - 1. Workmanship and equipment compliance with Contract Documents.
  - 2. Contract speed, capacity, floor-to-floor, and door performance comply with Contract Documents.
  - 3. Performance of following is satisfactory:
    - a. Starting, accelerating, running
    - b. Decelerating and stopping accuracy
    - c. Door operation and closing force
    - d. Equipment noise levels
    - e. Signal fixture utility
    - f. Overall ride quality
    - g. Performance of door control devices
    - h. Operations of emergency two-way communication device
    - i. Operations of firefighters' service
  - 4. Test Results:
    - a. In all test conditions, obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Owner and Consultant. Tests shall be conducted under both no load and full load condition.
    - b. Temperature rise in motor windings limited to 50° Celsius above ambient. A full-capacity one (1) hour running test, stopping at each floor for ten (10) seconds in up and down directions, may be required.
- E. Performance Guarantee: Should Consultant's review identify defects, poor workmanship, variance or noncompliance with requirements of specified codes and/or ordinances, or variance or noncompliance with the requirements of Contract Documents, Contractor shall complete corrective work in an expedient manner to satisfaction of Owner and Consultant at no cost as follows:
  - 1. Replace equipment that does not meet code or Contract Document requirements.
  - 2. Perform work and furnish labor, materials, and equipment necessary to meet specified operation and performance.
  - 3. Perform retesting required by Governing Code Authority, Owner, and Consultant.

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- F. A follow-up final contract compliance review shall be performed by Consultant after notification by Contractor that all deficiencies have been corrected. Provide Consultant with copies of the initial deficiency report marked to indicate items which Contractor considers complete.

1.7 OWNERS INFORMATION REGARDING ELEVATOR

- A. Non-Proprietary Equipment Design: Provide three sets of neatly bound written information necessary for proper maintenance and adjustment of equipment within 30 days following final acceptance. Final retention will be withheld until data is received by Owner and reviewed by Consultant. Include the following as minimums:
1. Straight-line wiring diagrams of "as-installed" elevator circuits with index of location and function of components. Mount one set wiring diagrams on panels, racked, or similarly protected, in elevator machine room. Provide remaining set rolled and in a protective drawing tube. Maintain all drawing sets with addition of all subsequent changes. These diagrams are Owner's property. A legend sheet shall be furnished with each set of drawings to provide the following information:
    - a. Name and symbol of each relay, switch, or other apparatus.
    - b. Location on drawings, drawing sheet number and area, and location of all contacts.
    - c. Location of apparatus, whether on controller or on car.
  2. Written Maintenance Control Program (MCP) specifically designed for the equipment included under this contract. Include any unique or product specific procedures or methods required to inspect or test the equipment. In addition, identify weekly, bi-weekly, monthly, quarterly, and annual maintenance procedures, including statutory and other required equipment tests.
  3. Printed instructions explaining all operating features.
  4. Complete software documentation for all installed equipment.
  5. Lubrication instructions, including recommended grade of lubricants.
  6. Parts catalogs listing all replaceable parts including Contractor's identifying numbers and ordering instructions.
  7. Four sets of keys for all switches and control features properly tagged and marked.
  8. Diagnostic test devices together with all supporting information necessary for interpretation of test data, troubleshooting of elevator system, and performance of routine safety tests.
  9. The elevator installation shall be a design which can be maintained by any licensed elevator maintenance company employing journeymen mechanics, without the need to purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment Contractor.
    - a. Provide onsite capability to diagnose faults to the level of individual circuit boards and individual discrete components for the solid state elevator controller.
    - b. Provide a separate, detachable device, as required, to the Owner as part of this installation if the equipment for fault diagnosis is not completely self-contained within the controller. Such device shall be in possession of and become property of the Owner.
    - c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Owner.

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10. Provide upgrades and/or revisions of software during the progress of the work, warranty period and the term of the ongoing maintenance agreement between the Owner and Contractor.
- B. Acceptance of such records by Owner/Consultant shall not be a waiver of any Contractor deviation from Contract Documents or shop drawings or in any way relieve Contractor from his responsibility to perform work in accordance with Contract Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSE-OUT PROCEDURES

- A. Operating and Maintenance Instructions: Arrange for each installer of equipment that required regular maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. All items to be provided or completed prior to Certificate of Substantial Completion being issued by the Owner. Include a detailed review of the following items:
  1. Maintenance manuals
  2. Record documents
  3. Spare parts and materials
  4. Tools
  5. Lubricants
  6. Fuels
  7. Identification systems
  8. Control sequences
  9. Hazards
  10. Cleaning
  11. Warranties and bonds
  12. Maintenance agreements and similar continuing commitments
  13. On site instructions to County maintenance personnel on major systems operations such as HVAC as per technical specifications.
- B. As part of instruction for operating equipment, demonstrate the following procedures, prior to the Owner issuing Certificate of Substantial Completion:
  1. Start-up
  2. Shutdown
  3. Emergency operations
  4. Noise and vibration adjustments
  5. Safety procedures
  6. Economy and efficiency adjustments

3.2 PROJECT CLOSE-OUT MANUALS AT SUBSTANTIAL COMPLETION

- A. Submit Project Close-out Manuals prior to issuance of final application for payment. Provide one (1) hardcopy.
- B. Bind in commercial quality 8 1/2" x 11" three ring binder, indexed with hardback, cleanable, plastic covers.
- C. Label cover of each binder with typed title PROJECT CLOSE-OUT MANUAL, with title of project; name, address, and telephone number of Contractor and name of responsible Principal.

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- D. Provide table of contents: Neatly typed, in the following sequence:
1. Final Certificate of Occupancy
  2. Warranty Service Subcontractors Identification List
  3. Final Lien Waivers and Releases
  4. Warranties and Guarantees
  5. Systems Operations and Maintenance Instruction
  6. Manufacturer's Certificates and Certifications
  7. Maintenance Service Contracts
  8. Spare Parts Inventory List
  9. Special Systems Operating Permits or Approvals
  10. Asbestos free materials notarized statement
- E. Provide all documents for each section listed. List individual documents in each section in the Table of Contents, in the sequence of the Table of Contents of the Project Manual.
- F. Identify each document listed in the Table of Contents with the number and title of the specification section in which specified, and the name of the product or work item.
- G. Separate each section with index to sheets that are keyed to the Table of Contents listing.
- H. Warranty Service Subcontractors List shall identify subcontractor supplier, and manufacturer for each warranty with name, address and emergency telephone number.
- I. Electronic Close-out DVD: At the completion of the project, submit one copy of a DVD with entire project close out information below in PDF format. All letter, legal and brochure size sheets shall be portrait and the As-built drawings will be landscape. All fonts will be Arial. All items will be in PDF with OCR (Optical Character Recognition). This will enable a search engine to identify words on the scanned documents.
1. Contacts: Set up a separate PDF for the contacts. No bookmarks are needed for this section.
  2. As-Built: All as-built drawings will be landscape.
  3. Submittals: All technical submittal items (approved and approved as noted) will be provided and sorted by the 46 standard divisions, if applicable. Bookmarks will be needed for the appropriate divisions.
  4. Operations and Maintenance Manual: Specify the division name only in the bookmarks (1-46). Please note that all items will be in PDF with OCR (Optical Character Recognition). This will enable a search engine to identify works on the scanned documents.
  5. Permitting: This should include the Certificate of Occupancy and any other document that the Project Manager may include pertaining to the permitting for the project.

3.3 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.



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- a. Remove labels that are not permanent labels.
  - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
  - c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface. Remove waste and surplus materials from the site in an appropriate manner.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
1. Where extra materials of value remaining after completion of associated work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01 77 00

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SECTION 01 78 00  
WARRANTIES AND BONDS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contractor Documents, including manufacturers standard warranties on products and special warranties.
  - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
  - 2. General close-out requirements are included in Section "Project Close-Out".
  - 3. Specific requirements for warranties for the work and products and installations that are specified to be warranted, are included in this document.
  - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties to not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
- B. Reinstatement of Warranty. When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligation, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligation, rights, or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept work for the Project where a special warranty, certification, or similar commitment is required on such work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

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1.4 WARRANTY PERIOD

- A. The Contractor shall participate with the County and the Engineer's representative, at the beginning of the tenth month of the warranty period, in conducting an on site review and evaluation of all items of equipment, materials and workmanship covered by the warranties and guarantees. Contractor shall act promptly and without cost to the County to correct all defects, problems, or deficiencies determined as such by the Engineer/Owner during on the site review.
- B. All warranties and guarantees shall commence on the date of Substantial Completion except for items which are determined by the County to be incomplete or a non-comply status at the time of Substantial Completion. The coverage commencement date for warranties and guarantees of such work shall be the date of the County's acceptance of that work.
- C. Warranty period shall be manufacturer's standard for product specified except where specific warranty periods are specified in individual sections. But in no case less than one year.

1.5 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. If the Engineer's Certificate of substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the work, submit written warranties upon request of the Project Manager.
  - 1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Project Manager within fifteen days of completion of that designated portion of the work.
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepared a written document that contains appropriate terms and identification, ready for executing by the required parties. Submit a draft to the Engineer for approval prior to final execution.
  - 1. Refer to individual Sections of Division 02 through 26 for specific content requirements, and particular requirements for submittal of special warranties.
- C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Bind (3) three sets of warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 1/2" by 11" paper.
  - 1. Provide heavy paper dividers with Celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
  - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the Project title or name, and the name of the Contractor.

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3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 78 00

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SECTION 02 41 13  
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SCOPE OF SECTION

- A. Cut, demolish and remove existing work associated with the renovation. Cut and remove existing work as indicated or necessary to fit new work to existing that is to remain. Where practical, salvage existing items that may be reused or are indicated for reuse or to be turned over to Owner.

1.2 REFERENCE STANDARDS

- A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- 1. ASTM E 84 Surface Burning Characteristics of Building Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- 2. NFPA 241 Safeguarding Construction, Alteration and Demolition Operations

- B. Unknown Conditions: Work shall not include Contractor's identification, detection, abatement, encapsulation or removal of asbestos or similar hazardous substance(s). In the course of performing this work, if such material/product is encountered, discontinue work and remove workers from the project until such material/product and hazards connected therewith are abated, encapsulated or removed, or it is determined that no hazard exists. An extension of time will be granted for delay resulting from such condition and correction.
- C. Structural Members: Do not cut any building structure without written authorization of the Engineer. Any structural members intentionally cut without proper authorization or accidentally cut shall be restored to their original integrity and condition.
  - 1. Do not cut or drill existing concrete pre cast slabs. Use existing chases and openings at floor slabs.

1.3 PROTECTION

- A. Safety: Before commencing any work, provide warning signs, lights, barricades, fences, rails and other safety devices. Exercise caution when working adjacent to spaces occupied by Owner's personnel.
- B. Temporary Work: Do not commence demolition until temporary shoring, bracing, partitions, exits and other support and protective measures have been properly installed.
- C. Temporary Partitions and Closures: Where new existing openings are created and where work is in occupied spaces or existing equipment, provide physical separation and protect from dust and moisture with partitions and closures. Maintain partitions in place until new work has been completed and provide protection from the weather and dust. Before and during removal, clean all surfaces with a vacuum cleaner (to avoid dispersion of dust).

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- D. Portable Coverings: For minor interior alterations, where acceptable to Engineer, flame-proofed drop cloths may be used. Plastic sheet or film shall not be used for any purpose for interior work.
- E. Air filters: During Demolition provide portable air filters as part of dust control.
- F. Wet mop concrete floors slab to control dust.
- G. Vacuum space every day at the completion of the work.

1.4 SECURITY

- A. Establish procedures and execute operations to provide continuous security. Provide temporary protection for openings and at other locations as may be appropriate during construction. Deny entrance of unauthorized persons into work area.

1.5 HOUSEKEEPING

- A. Collect debris, rubbish and trash resulting from operations at designated places. Sprinkle dusty debris with water. Handle in a controlled manner. Do not accumulate waste unnecessarily; remove promptly from premises; generally daily. Sweep and vacuum floors in work areas as frequently as necessary to maintain premises in acceptable condition for continuous, uninterrupted operation by Owner.

1.6 OCCUPIED SPACES

- A. Since the building will maintain operations, coordination will be required with building staff and owners representative to coordinate time of demolition to minimize disturbance occupants.

PART 2 - MATERIALS

2.1 LUMBER

- A. Wood and plywood used in building temporary partitions shall be fire-retardant treated to provide flame spread rating, per ASTM E 84, or maximum of twenty-five (25).

2.2 TAPE

- A. Kraft paper two (2) inches wide with pressure sensitive adhesive one side. Shear strength (peel adhesion); 60-oz. per inch width. Acceptable: Fastape or approved equal.

2.3 TEMPORARY CLOSURES

- A. In addition to the requirements of Division 01, flame-proofed drop cloths (not flammable plastic), UL labeled, flame spread maximum fifteen (15). Where daylight would be beneficial for workmanship and reduce need of artificial illumination, translucent polyvinyl chloride film reinforced in diamond pattern with 33 nylon threads per foot. Acceptable: "Griffolyn" T-55-FR, Reed Industries, Box 248, Houston, Texas 77233, phone 800/231-6074 or approved equal.

PART 3 - EXECUTION

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3.1 RELOCATION AND REMOVAL

- A. Temporarily remove or suitably relocate designated equipment, utilities or services to clear the work, or to properly function in the complete installation. Where services or utilities are removed, suitable cap or terminate according to applicable ordinances and requirements of governing authorities and/or per other sections of specifications and drawings. Where such items interfere with the work and specific instructions are not included on the drawings, they shall be adequately protected and further instructions requested from the Engineer. Existing construction that does not interfere with new work and will be concealed may remain in place unless indicated to be removed.

3.2 PORTABLE COVERINGS

- A. For interior alterations, where acceptable to Engineer, flame-proofed drop cloths may be used. Flammable plastic sheet or film shall not be used within the building.

3.3 DEMOLITION

- A. Plan of Operations: Establish procedures for safe removal of parts by methods that will not transmit excessive vibrations to or eccentric loads on building structure, create a nuisance, damage existing work that will remain, nor endanger either workmen, public, occupants nor adjacent work.
- B. Supervision: Cut and demolish under supervision of a competent foreman, capable of identifying hazardous conditions and authorized to promptly take corrective action to eliminate them.
- C. Precaution: Exercise care to avoid unnecessary damage to work that shall remain or stored for reinstallation.
- D. Hole Cutting: Neatly cut holes where necessary. Keep area and debris covered to minimize creation of dust. Use care and adjust hole locations as required to minimize necessary cutting.
- E. Finishes and Exposed Work: Cut to true and straight lines to permit satisfactory refinishing or connection to new work. Remove items to nearest full piece that is to remain.

3.4 OWNERSHIP OF MATERIALS

- A. Salvaged materials that are to be relocated or remain the property of the Owner shall be carefully removed and stored on the site for reuse or disposition specified. Other materials become the property of Contractor and shall be removed and disposed of off the site.

3.5 SALVAGE OPERATIONS

- A. Salvage existing materials/products identified to be reused or turned over to Owner. Carefully remove, collect, protect, repair, clean or restore to first class condition, relocate and reinstall where and as indicated. After cleaning and repairing salvaged items to be furnished to Owner, place in location on premises designated by Owner's representative.

3.6 REMOVAL

- A. Remove materials/products/equipment which are not to be reused in the work in an orderly and careful manner so as not to endanger or damage adjacent work which is to

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remain. When removing nails by claw hammer, place a small piece of wood under the hammer head to keep claws at right angle to the nail and prevent damage to the surface.

3.7 DISPOSAL

- A. Haul rubbish, debris and unusable material away from the site promptly and dispose of legally. Burning on site is prohibited.

3.8 CLEANING

- A. Clean surfaces as described in specifications.

3.9 CONCRETE

- A. Exercise due caution in cutting and patching, chipping or general concreting so as not to deface that portion of the existing structure which is to remain. Should any such impairment occur, immediately clean or restore to original condition at no cost to Owner.
- B. Do not cut or core existing, concrete slabs, columns, joist and beams.
- C. Patch all existing slab penetrations caused by demolition of mechanical and plumbing with rated and UL listed seal assembly.

3.10 UTILITIES AND RELATED EQUIPMENT, PLUMBING, AND ELECTRICAL WORK

- A. Protect existing utilities, storm, waste, water, fire protection, conduit racks, refrigerant pipes and raceways as indicated and as uncovered by the work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Engineer. If electrical, communications, fire protection and systems lines are encountered and not shown on drawings, contact the Engineer prior to the start of the work.

3.11 DRYWALL

- A. Within the limits of the work, should any portion of existing drywall surfaces be deemed broken, scratched or unfastened, spackle with drywall compound, refasten or other wise repairs. Where indicated on the drawings for drywall to be removed remove the covering, base, drywall board, vapor barrier, insulation, metal furring and all fasteners.
- B. Within the limits of the work make repairs to drywall partitions. Match adjacent surfaces or as indicated on the drawing.
- C. Within the limits of tile work remove drywall ceiling and ceiling suspension system and supports, fasteners complete.

3.12 PATCHING

- A. Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish.
- B. Where patching occurs on rated partition or fireproofed structure repair to match existing UL rated system to match code required hourly rating for assembly.



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3.13 FIRESTOPPING AND DRAFT STOPPING

- A. Fire stop existing holes at all masonry walls, floor slab & GWB Partitions.
- B. Fire stop existing open ends of conduits:
- C. Fire stop all existing plumbing penetrations at existing rated walls and floors.
- D. Draft stop all penetrations into cavity of walls, ceilings, and attics. They include all penetrations created by new work or penetrations left by removal of existing proposed for replacement.

3.14. ACOUSTICAL LAY-IN CEILING

- A. Remove and re-install existing acoustical ceiling and suspension system as required by the work U.O.N. on the drawings. If any portion of the existing ceiling is damaged by the Contractor, it shall be replaced to match existing.

END OF SECTION 02 41 13

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SECTION 07 60 00  
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Miscellaneous sheet metal accessories.
  - 2. Gutters and downspouts
  - 3. Sealants and bonding agents between components of this Section and between the roof and other materials.
- B. Provide all accessories and items essential for the completeness of the sheet metal installation. Such items, unless otherwise shown on the Drawings or specified, shall be the same kind of materials as the item to which applied. Nails, screws, and bolts shall be of the types suited for the purpose intended, and shall be compatible with the metal to which it will contact.
- C. Forming and assembling of sheet metal components shall be performed using methods that will not void the manufacturer's finish warranties.
- D. All flashing and sheet metal items shall be provided and installed to provide for a complete watertight and weathertight installation in every respect.
- E. All roof and building flashing shall be copper.

1.2 SUBMITTALS

- A. Submit in accordance with Division 01 requirements.
- B. Product Data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
- C. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems. Provide plan layouts at 1/4-inch scale and details at 3-inch scale, for all sheet metal pieces and accessories.

1.3 QUALITY ASSURANCE

- A. Except as otherwise shown on Drawings or specified, the workmanship of sheet metal work, method for forming joints, anchoring, cleating and provisions for expansion shall conform to the standard details and recommendations of the Copper and Brass Research Association; and workmanship shall be of the best quality, in accordance with best trade practice and the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

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- B. Where pre-engineered manufactured systems are specified, other field fabricated or shop fabricated substitutions will not be accepted.
- C. All sheet metal flashings shall conform to the criteria of SMACNA "Architectural Sheet Metal Manual" whether or not detailed as such.
- D. Fabricator and installer shall be a company specializing in sheet metal work and installation with five (5) years documented experience.

1.4 PROJECT CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The type and locations of the various kinds, gages, thickness, and finish of sheet metal to be used is specified hereinafter under the individual items. Where sheet metal is indicated on Drawings and kind or type of metal is not definitely specified, sheet metal shall match the type as used on the rest of the project.
- B. Sheet Aluminum: ASTM B 209, alloy 3003, temper H14, AA C22A41 clear anodized finish; 0.032 inch thick (20 gage) except as otherwise indicated.
- C. Extruded Aluminum: Manufacturer's standard extrusions of sizes and profiles indicated, 60063 T52, AA C22A41 clear anodized finish; 0.080 inch minimum thickness for primary legs of extrusions.
- D. Color Finish: All exposed sheet metal shall be thoroughly cleaned and pretreated before application. Exposed to view surfaces shall be mill finish aluminum.

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- E. Shop fabricated aluminum flashings shall be fabricated to configurations indicated on the Drawings.
  - 1. Fabricate from nominal, .032 inch thick aluminum sheet with factory applied finish as specified herein. Color to be Owner approved.
  - 2. Fascia shall be provided with concealed splice plates for joints 10 feet on center.
  
- D. Gutters and Downspouts:
  - 1. Hanging Gutters: Prefinished .032" aluminum. Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Join sections with riveted lapped joints sealed with elastomeric or butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter spacers and brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
    - a. Gutter Style: K
    - b. Expansion Joints: Lap type
  
  - 2. Downspouts: Fabricate smooth (non-corrugated) rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
    - a. Manufactured Hanger Style: Similar to figure 1-35C in the SMACNA 5th Edition.
    - b. Provide prefinished aluminum splash pans at the outlet of gutters which discharge onto other roofs.
    - c. Provide all items and accessories as required for a complete installation in every respect.

## 2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
  
- B. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed.
  
- C. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.
  
- D. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

## 2.3 FABRICATION

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- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART 3 - EXECUTION

3.1 INSPECTION

- A. The Installer must examine substrates and conditions under which metal flashings will be installed, and notify Contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 PREPARATION

- A. Separate dissimilar metals from each other by painting each metal surface in area of contact with a heavy application of bituminous coating.

3.3 INSTALLATION REQUIREMENTS

- A. General: Comply with recommendations with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install work with provisions for thermal expansion of flashings, gravel stops, and other items exposed for more than 15 feet continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams where shown, or if not shown, in

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conformance with applicable recommendations of "Architectural Sheet Metal Manual" by SMACNA.

- C. Sheet metal work shall be watertight and weathertight; lines, arises, and angles sharp and true; plain surfaces free from waves and buckles. Workmen shall be experienced in the trade and thoroughly capable of performing the Work in accordance with these requirements.
- D. Underlayment: Where aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.
- E. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.
- F. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- G. Prefabricated Reglets and Counterflashing
  - 1. Apply continuous bead of sealant or plastic cement to back of type "SM" reglet.
  - 2. Install Type "SM" reglet on surface of flexible flashing on wall parallel to roof slope with fasteners furnished by manufacturer. Fill top groove with sealant and tool tight against wall with surface of sealant sloping to outside.
  - 3. Position counterflashing into reglet and "snap" into place against wall flashing.
- H. Flashing at Roof Penetrations (Miscellaneous)
  - 1. Work under this Section shall include the flashing of roof penetrations not otherwise specified under other Sections.
  - 2. Flashing at roof penetrations not detailed on the Drawing shall be performed according to the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

3.5 GENERAL INSTALLATION PROVISIONS

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

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- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

END OF SECTION 07 60 00

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SECTION 07 84 13  
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the fire-resistance-rated assemblies, including both new and existing empty openings and new and existing openings containing penetrating items.
- B. Firestopping shall be designed and constructed in accordance with the Florida Building Code, Florida Fire Code and Uniform Fire Safety Standards as adopted by the State Fire Marshall and latest addendums

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
  - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
  - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
  - 3. Fire-resistance-rated roof assemblies.
  - 4. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
  - 5. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
    - Penetrations located outside wall cavities.
    - Penetrations located outside fire-resistive shaft enclosures.
    - Penetrations located in construction containing fire-protection-rated openings.
    - Penetrating items larger than 4-inch (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.
  - 6. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
  - 7. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  - 8. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
  - 9. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.



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10. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
  1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
  2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses owners, and other information specified.
- D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

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1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
  - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
  - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

UL in "Fire Resistance Directory."

- E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Hilti Construction Chemicals, Inc.  
Nelson Firestop Products.  
3M Fire Protection Products.

2.2 FIRESTOPPING

- A. General: Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-/rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

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- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
  - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
  - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

### 3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
  - 2. Install fill materials for firestop systems by proven techniques to produce the following results:
    - 3. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
    - 4. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
    - 5. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: The Contractor shall engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

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- B. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
- D. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Labels shall be installed above ceilings and in concealed spaces. Include the following information on labels:
  - 1. The words: "FIRE AND SMOKE BARRIER PROTECT ALL OPENINGS".  
Contractor's name, address, and phone number.  
Through-penetration firestop system designation of applicable testing and inspecting agency.  
Date of installation.  
Through-penetration firestop system manufacturer's name.  
Installer's name.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07 84 13

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SECTION 09 91 00  
PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Texturing of new gypsum board at new and patched walls.
  - 2. Surface preparation and field application of paints.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. D6886 - Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography.
- B. Green Seal, Inc. (GS) 11 - Standard for Paints and Coatings.
- C. Master Painters Institute (MPI) - Architectural Painting Specification Manual.
- D. South Coast Air Quality Management District (SCAQMD) Rule 1113 - Architectural Coatings.

1.3 SUBMITTALS

- A. Submittals for Review:
  - 1. Product Data: Manufacturer's data on materials proposed for use including:
    - a. Product designation and grade.
    - b. Product analysis and performance characteristics.
    - c. Standards compliance.
    - d. Material content.
    - e. Mixing and application procedures.
  - 2. Samples:
    - a. 8 x 11 inch samples of each coating system and color.
  - 3. Paint Schedule: Indicate types and locations of each surface, paint materials, and number of coats to be applied.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicators shall be licensed Sub-Contractor, or locally registered Sub-Contractors in Orange County, Florida, skilled in successful applications of the specified products on comparable projects for a minimum of 5 years.
- B. Manufacturer(s) Qualifications: Utilize only manufacturers making the specified products as a regular and current production item.
- C. Materials, Preparation, and Workmanship: Conform to MPI Painting Manual.

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D. Mockup:

1. A sample room will be designated to receive representative complete finishes for each finish required. Upon acceptance in all respects (substrate preparation, surface moisture content, primer/filler application, finish coat application, mil thicknesses, etc., these spaces shall be used as the basis for acceptability for all other similar finishes and spaces.
2. Contractor will paint an 8' x 8' finished sample of each color to be used for interior colors for Owner and Architect approval prior to purchasing the paint for the project.
3. Approved mockup will remain as part of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Container Labels: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage rates, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- B. Paint Materials: Store at ambient temperature from 50 to 90 degrees F in ventilated area, or as required by manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures or relative humidity are outside ranges required by paint manufacturer.
- B. Maintain ambient and substrate temperatures above manufacturer's minimum requirements for 24 hours before, during and after paint application.
- C. Do not apply materials when relative humidity is above 85 percent or when dew point is less than 5 degrees F different than ambient or surface temperature.
- D. Provide lighting level of 30 foot-candles at substrate surface.

1.7 SURFACE PREPARATION

- A. Prior to starting Work, the Applicator shall certify acceptance of all substrates.
- B. In general, substrates shall be dry, clean and slightly rough. Surfaces to be painted shall be free of dirt, oil, release agents, grease, rust mill scale, efflorescence, laitance and other surface imperfections and contaminates or any substance which may adversely affect the performance of the coating before the application process begins.
- C. Paint manufacturer shall assist the Paint Contractor with prearranged site visits during surface preparations or product application phases of the job to assure the quality of the work meets all plans, specifications, or applicable standards. Site Visit Report is required for all visits to the job by Manufacturer's representatives. Any issues or deviations to the specifications must be included. Site Visit Reports will be furnished free of charge as a courtesy of the paint manufacturer.

1.8 DESIGN INTENT

- A. New Construction
  1. Surfaces to receive initial painting shall receive a primer and two finish coats.
  2. Due to certain tinted colors, low hiding colors or radical color changes, industry standards may require an additional finish coat(s).



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B. Repainting Existing Construction:

1. Surfaces previously painted with a latex or acrylic-based paint generally require no primer unless previously painted surface has damaged coatings.
2. Typically, one finish coat or more to hide tinted primer is all that is required for coverage over correctly tinted primers.

C. Paint manufacturer's representative(s) shall review and approve all paint specifications and substrates prior to initial paint coating application.

1.9 Compatibility

A. Materials shall be applied as one unified system, i.e. surface preparation, primer, second coat and third coat. All products compatible, each dependent upon the other and as recommended by the coating manufacturer for a particular finish on a particular surface.

B. Thinners, if any, shall be only those recommended for that purpose by the manufacturer of the material to be thinned.

C. Coating materials selected for systems for each type of surface shall be the product of a single manufacturer.

1.10 PROPER SEQUENCE AND SCHEDULING

A. Slightly vary the color of succeeding coats.

B. Allow sufficient time between successive coats for proper drying, in accordance to the manufacture's written instructions.

C. The number of coats and film thickness required are the same regardless of application method. Coatings shall be solid, continuous and procuring pinhole-free surfaces.

D. Omit primer over metal surfaces that have been shop primed and touchup painted.

E. If undercoats, stains or other conditions show through the final coat of paint, at no additional cost , apply additional coats until paint film is of uniform finish, color and appearance.

1.11 MAINTENANCE

A. Extra Materials: 1 gallons of each color and sheen.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Equivalent products by following manufacturers are acceptable:

1. Glidden Professional
2. PPG Architectural Finishes, Inc.
3. Sherwin Williams

2.2 MATERIALS

A. Paints:

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1. As scheduled at end of Section.
  2. Free from all forms of lead and mercury.
- B. Maximum Volatile Organic Compound (VOC) Content for interior paints, coatings, and accessories, tested to ASTM D6886:
1. Primers: 150 grams per liter.
  2. Flat paints and coatings: 150 grams per liter.
  3. Non-flat paints and coatings: 150 grams per liter.

2.3 ACCESSORIES

- A. Accessory Materials: Paint thinners and other materials required to achieve specified finishes; commercial quality.
- B. Patching Materials: Latex filler.
- C. Fastener Head Cover Materials: Latex filler.

2.4 MIXES

- A. Deliver paints pre-mixed and pre-tinted.
- B. Uniformly mix to thoroughly disperse pigments.
- C. Thinners, if any, shall be only those recommended for that purpose by the manufacturer of the material to be thinned.
- D. Re-mix paint during application; ensure complete dispersion of settled pigment and uniformity of color and gloss.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Measure moisture content of surfaces using electronic moisture meter. Do not apply coatings unless moisture content of surfaces are below following maximums:
1. Gypsum board: 12 percent.
  2. Masonry: 12 percent.
  3. Concrete floors: 8 percent.

3.2 PREPARATION

- A. General:
1. Protect adjacent and underlying surfaces.
  2. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
  3. Correct defects and clean surfaces capable of affecting work of this section.
  4. Seal marks that may bleed through surface finishes with shellac.
- B. Gypsum Board:
1. Fill minor defects with filler compound. Spot prime defects after repair.
  2. Apply texture to match existing in accordance manufacturer's instructions.

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C. Concrete Floors:

1. Remove contamination, acid etch, and rinse floors with clear water. Allow to dry.
2. Verify that required acid-alkali balance has been achieved.

D. Existing Surfaces:

1. Remove loose, flaking, powdery, and peeling paints.
2. Lightly sand glossy painted surfaces.
3. Fill holes, cracks, depressions and other imperfections with patching compound; sand flush with surface.
4. Remove oil, grease, and wax by scraping; solvent wash and thoroughly rinse.
5. Remove rust by wire brushing to expose base metal.

3.3 APPLICATION

- A. Apply paints in accordance with manufacturer's instructions.
- B. Apply primer or first coat closely following surface preparation to prevent recontamination.
- C. Do not apply finishes to surfaces that are not dry.
- D. Apply coatings to minimum dry film thickness recommended by manufacturer.
- E. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- F. Apply coatings to uniform appearance without laps, sags, curtains, holidays, and brush marks.
- G. Allow applied coats to dry before next coat is applied.
- H. When required on deep and bright colors apply an additional finish coat to ensure color consistency.
- I. Continue paint finishes behind wall-mounted accessories.
- J. Match final coat to approved color samples.

3.4 ADJUSTING

- A. Touch up or refinish disfigured surfaces.

3.5 CLEANING

- A. Remove paint from adjacent surfaces.

3.6 PAINT SCHEDULE

- A. Types of paint listed herein are set forth as standard of quality and type of coating required for each type of surface.
  1. Paint exposed surfaces of types listed in Paint Schedule.
  2. Paint other exposed surfaces not specifically listed with not less than two coats of appropriate type of coating.

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B. Prime coat consists of touch up on shop primed [and existing] surfaces with intact coatings.

SUBSTRATE	COATS	GLIDDEN PROFESSIONAL	SHERWIN-WILLIAMS	PPG ARCHITECTURAL PAINTS
<b>EXTERIOR SURFACES</b>				
Ferrous and Galvanized Metal Industrial Grade Acrylic (S-G)	1 <sup>ST</sup> <i>2.2 mils DFT</i>	Touch-up Shop-Coat Primer or DEVFLEX Arrylic Metal Primer 4020PF	Touch-up Shop-Coat Primer w/Pro-Cryl Universal Metal Primer B66-310	PPG primer for specific surface
	2 <sup>ND</sup>	DEV FLEX High-Performance Waterborne Acrylic Semi-Gloss Enamel 4216L <i>(2.1 mils DFT)</i>	Fast Clad HB Acrylic <i>(4.2 mils DFT)</i>	BREAK-THROUGH 50 Waterborne Acrylic, Satin <i>(2. mils DFT)</i>
	3 <sup>RD</sup>	DEV FLEX High-Performance Waterborne Acrylic Semi-Gloss Enamel 4216L <i>(2.1 mils DFT)</i>	3 <sup>rd</sup> Coat Not Required	BREAK-THROUGH 50 Waterborne Acrylic, Satin <i>(2. mils DFT)</i>
<b>INTERIOR SURFACES</b>				
<b>Gypsum Board, (Latex S-G)</b>	1 <sup>ST</sup> <i>2.0 MILS DFT</i>	LIFEMASTER NO VOC INTERIOR PRIMER 9116-1200	Harmony Latex Primer B11W900	SPEEDHIDE MaxBuild Drywall Surfacers
<i>[Min. total 6.0 mils DFT]</i>	2 <sup>ND</sup> <i>2.0 MILS DFT</i>	ULTRA-HIDE No VOC Semi-Gloss 1415	ProMar 200 Zero VOC S/G B30-2600 Series	SPEEDHIDE Interior Enamel Latex Semi-Gloss
<i>[System I-5]</i>	3 <sup>RD</sup> <i>2.0 MILS DFT</i>	ULTRA-HIDE No VOC Semi-Gloss 1415	ProMar 200 Zero VOC S/G B30-2600 Series	SPEEDHIDE Interior Enamel Latex Semi-Gloss
<b>Concrete Floors</b> <i>(Water-based Acrylic, solid / opaque color stain) (Gray Color)</i> <i>[System F-1]</i>	2 Coats	Concrete Coatings Concrete Stain 3610	H&C Shield Plus Ultra Concrete Stain	PERMA-CRETE Color Seal Acrylic Concrete Stain 4-4200
<b>INTERIOR RE-PAINTING</b>				
Latex over Latex <i>[Semi-Gloss]</i>	1 <sup>ST</sup> <i>2.0 MILS DFT</i>	Touch-up prime as required	Touch-up prime as required	Touch-up prime as required
<i>[System EX-1]</i>	2 <sup>ND</sup> <i>2.0 MILS DFT</i>	ULTRA-HIDE No VOC Semi-Gloss 1415	ProMar 200 Zero VOC S/G B30-2600 Series	SPEEDHIDE Interior Enamel Latex Semi-Gloss

END OF SECTION 09 91 00

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SECTION 14 24 00  
HYDRAULIC ELEVATOR

PART 1 GENERAL

1.01 WORK INCLUDED

- A. 1 hydraulic passenger elevator: Cars 1
- B. All engineering, equipment, labor, and permits required to satisfactorily complete elevator modernization required by Contract Documents.
- C. Applicable conditions of General, Special, and Supplemental Conditions, Division 01, and all sections listed in Contract Documents "Table of Contents."
- D. Preventive maintenance as described in Section 01 85 00 and the COUNTY Maintenance Agreement.
- E. Cartage and Hoisting: All required staging, hoisting and movement to, on, and from the site including new equipment, reused equipment, or dismantling and removal of existing equipment.
- F. Unless specifically identified as "Reuse," "Retain," or "Refurbish," provide new equipment.
- G. Hoistway, pit, and machine room barricades as required.

1.02 RELATED WORK PROVIDED UNDER OTHER SECTIONS

- A. **See Drawings.**

1.03 DEFINITIONS

- A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.
- B. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.
- C. Provisions of this specification are applicable to all elevators unless identified otherwise.

1.04 QUALITY ASSURANCE

- A. Qualified Contractors will be at the discretion of the COUNTY.
- B. Compliance with Regulatory Agencies: See Section 01 31 00, Project Management and Coordination.
- C. Warranty:
  - 1. Material and workmanship of installation shall comply in every respect with Contract Documents. Correct defective material or workmanship which develops within one year from date of final acceptance of all work to satisfaction of Architect, Owner and

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Consultant at no additional cost. Perform maintenance in accordance with terms and conditions indicated in the COUNTY Preventive Maintenance Agreement.

- a. **See Orange County Preventative Maintenance Agreement for terms and conditions and service standards.**
2. Defective is defined to include, but not be limited to: Operation or control system failures, car performance below required minimum, excessive wear, unusual deterioration, or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise, or vibration, and similar unsatisfactory conditions.
3. Retained Equipment: All retained components, parts, and materials shall be cleaned, checked, modified, repaired, or replaced so each component and its parts are in like new operating condition. Retained equipment must be compatible for integration with new systems. All retained equipment shall be covered under the warranty provisions. No prorations of equipment or parts shall be allowed on preventive maintenance contract, between the Contractor and Owner.
4. Make modifications, requirements, adjustments, and improvements to meet performance requirements.

1.05 DOCUMENT AND SITE VERIFICATION

- A. In order to discover and resolve conflicts or lack of definition which might create problems, Contractor must review Contract Documents and site conditions for compatibility with its product prior to submittal of quotation. Review existing structural, electrical provisions, and mechanical provisions for compatibility with Contractor's products. Purchaser will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Elevator equipment.

1.06 SUBMITTALS

- A. See Section 01 33 00, Submittals, and Section 01 77 00 , Final Contract Compliance Review.

1.07 PERMIT, TEST AND INSPECTION

- A. Obtain and pay for permit, license, and inspection fee necessary to complete installation.
- B. Perform test required by governing authority in accordance with procedure described in ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks in the presence of Authorized Representative.
- C. Supply personnel and equipment for test and final review by Consultant.

1.08 MAINTENANCE

- A. Interim: Contractor will perform interim maintenance and services as outlined in the County Elevator Maintenance Agreement.
- B. Warranty Maintenance: 12 Month Warranty Shall Commence at the conclusion of all elevators passing all required alteration inspections and receiving final acceptance after all punch list items are confirmed cleared. Service standards and requirements shall be referenced in the County Elevator Maintenance Agreement.

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PART 2 PRODUCTS

2.01 SUMMARY

- A. Passenger Elevator #1 (AHJ Serial # 26530)
- B. Unless specifically identified as "retain existing," provide new equipment.

	Existing Equipment	Disposition
Number:	Passenger #1	Retain Existing
Capacity:	2,000lbs	Retain Existing
Contract Speed:	100FPM <i>*Verify Retain Existing Speed*</i>	Retain Existing
Machine:	Hydraulic Pump	Provide New
Machine Location:	Adjacent at 1 <sup>st</sup> floor	Retain Existing
Operational Control:	Simplex Selective Collective	Provide New Simplex Selective Collective Microprocessor-Based System
Motor Control:	Single Speed AC with Wye Delta Start	Single Speed AC with Soft Start with Closed Transition
Power Characteristics:	480 Volts, 3 Phase, 60 Hertz <i>*Verify Existing*</i>	Retain Existing
Stops:	Two (2)	Retain Existing
Openings:	Two (2)	Retain Existing
Floors Served:	*1, 2	Retain Existing
Entrance Size:	36"x84"	Retain Existing
Entrance Type:	Two Speed Side Opening	Retain Existing
Door Operation:	Medium Two Speed	Provide New GAL MOVFR11
Door Protection:	Light Ray Device	Provide New Janus Pana 40
Guide Rails:	Planed Steel Tees	Retain Existing
Buffers:	Spring	Retain Existing
		Battery Powered Emergency Car Lighting. Provide Separate Constant Pressure Test Button in Car Service Compartment.

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Existing Equipment	Disposition
Signal Fixtures:	LED Illumination
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser Single Car Operating Panel
Car Position Indicators:	Single Digital with Car Direction Arrows Integral with Car Operating Panel
Communication System:	Self-Dialing, Vandal Resistant, Push to Call, Two-Way Communication System with Recall, Tracking and Voiceless Communication. Provide telephone line operability device with audible tone as required by code.
Fixture Submittal:	Submit Brochure Depicting Contractor's Proposed Designs with Bid
Additional Features	Car Top Inspection Station
	Firefighters' Service, Phase I And II, Including Alternate Floor Return
	Accessibility Signage
	Hoistway Access Switches Top and Bottom Floors, Locate in most cost effective location.
	Hoistway Door Unlocking Device All Floors
	Independent Service Feature
	Hydraulic Pump Unit, and Controller Sound Isolation
	Tamper Resistant Fasteners for All Fastenings Exposed to the Public



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Existing Equipment	Disposition
	One Year Warranty Maintenance with 24-Hour Call-Back Service
	No Visible Company Name or Logo
	Wiring Diagrams, Operating Instructions, and Parts Ordering Information
	Non-Proprietary Control System and Diagnostics Provisions

2.02 MATERIALS

A. SITE CONDITION INSPECTION

1. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
2. Do not proceed with installation until work in place conforms to project requirements.

B. PRODUCT DELIVER, STORAGE AND HANDLING

1. Delivery of any equipment shall be coordinated well in advance with the Engineering Department.
2. Verify proper structural load limitations as needed for areas that will have equipment transported on. All costs associated with any damage that resulted from equipment delivery, equipment removal or equipment staging is the sole responsibility of the Contractor.
3. Deliver material in Contractor's original unopened protective packaging.
4. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
5. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.
6. Allocate available site storage areas and coordinate their use with Purchaser and other Contractors.
7. Provide suitable temporary weather-tight storage facilities as may be required for materials that will be stored in the open.

C. INSTALLATION REQUIREMENTS

1. Retain at least one existing elevator's equipment onsite to provide for immediate spare parts for elevators awaiting modernization.
2. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
3. Install machine room equipment with clearances in accordance with referenced codes and specification.
4. Install all equipment so it may be easily removed for maintenance and repair.
5. Install all equipment for ease of maintenance.
6. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
7. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.

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8. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
  9. Machine room equipment, and pit equipment.
  10. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.
- D. MANUFACTURER'S NAMEPLATES
1. Manufacturer's name plates and other identifying markings shall not be affixed on surfaces exposed to public view. This requirement does not apply to Underwriter's Laboratories and code required labels.
  2. Each major component of mechanical and electrical equipment shall have identification plate with the Manufacturer's name, address, model number rating, and any other information required by governing codes.
- E. COLORS OF FACTORY-FINISHED EQUIPMENT
1. All colors will be selected from the Manufacturer's standard range unless custom colors are specified herein.
- F. MATERIALS AND FINISHES
1. Steel:
    - a. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
    - b. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
    - c. Structural Steel Shapes and Plates: ASTM A36.
  2. Stainless Steel: Type 302 or 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature. Protect with adhesive paper covering.
  3. No. 4 Satin: Directional polish finish. Graining directions in vertical dimension.
  4. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
  5. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050"  $\pm$  0.005" thick.
  6. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- G. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.

2.03 CAR PERFORMANCE

- A. Car Speed:  $\pm$  5% of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone:  $\pm$ 1/4" under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open:
  1. 2.2 seconds.

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- E. Door Closing Time: Seconds from start of closing to fully closed:
  - 1. 3.4 seconds.
  
- F. Pressure: Fluid system components shall be designed and factory tested for 500 p.s.i. Maximum operating pressure shall be 400 p.s.i.
  
- G. Car Ride Quality:
  - 1. Horizontal and vertical acceleration within car during all riding and door operating conditions. Not more than 20 mg peak to peak (adjacent peaks) in the 1 - 10 Hz range.
  - 2. Acceleration and Deceleration: Smooth constant and not less than 3 feet/second<sup>2</sup> with an initial ramp between 0.5 and 0.75 second.
  - 3. Sustained Jerk: Not more than 6 feet/second<sup>3</sup>.
  - 4. Measurement Standards: Measure and evaluate ride quality consistent with ISO 18738, using low pass cutoff frequency of 10 Hz and A95 peak-to-peak average calculations.
  
- H. Noise and Vibration Control
  - 1. Airborne Noise: Measured noise level of elevator equipment and its operation shall not exceed 55 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the "A" weighted scale.
  - 2. Vibration Control: All elevator equipment provided under this contract, retained, refurbished or replaced shall be mechanically isolated from the building structure and electrically isolated from the building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the building.
    - a. CE Electronics-Acoustics (813-373-4826) products must be utilized for mechanical isolation of the following:
      - 1) CE Electronics-Acoustics Group, CQuiet Cab Isolation Kit located between the piston and platen plate.
      - 2) CE Electronics-Acoustics Group, CQuiet Hydro Tank Isolation Kit located under the oil tank reservoir.
      - 3) CE Electronics-Acoustics Group, CQuiet FireStop Noise Putty located between the pipe and concrete penetrations.
      - 4) CE Electronics-Acoustics Group, CQuiet Pipe ISO<sup>2</sup> hangers for any pipe that requires hanging from ceiling.
      - 5) CE Electronics-Acoustics Group, CQuiet Pipe Stand Isolation for any pipe stand application utilized.

2.04 OPERATION

- A. Selective Collective Microprocessor-Based
  - 1. Operate car without attendant from pushbuttons in car and located at each floor. When car is available, automatically start car and dispatch it to floor corresponding to registered car or hall call. Once car starts, respond to registered calls in direction of travel and in the order the floors are reached.
  - 2. Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of car and corresponding to the direction of car travel have been answered.
  - 3. Slow car and stop automatically at floors corresponding to registered calls, in the order in which they are approached in either direction of travel. As slowdown is

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- initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
4. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is highest (or lowest) call registered.
  5. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.
- B. Other Items:
1. Low Oil Control: In the event oil level is insufficient for travel to the top floor, provide controls to return elevator to the main level and park until oil is added.
  2. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.
- C. Firefighters' Service: Provide equipment and operation in accordance with code requirements.
- D. Automatic Car Stopping Zone: Stop car within 1/4" above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings.
- E. Remote Monitoring and Diagnostics: Equip each controller, traveling cable and elevator with appropriate provisions to easily connect to a future "Campus Wide" comprehensive Lift-Net Elevator Monitoring System.
- F. Motion Control: A C type with unit valve suitable for operation specified and capable of providing smooth, comfortable car acceleration and retardation. Limit the difference in car speed between full load and no load to not more than  $\pm 5\%$  of the contract speed in either direction of travel.
- G. Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors. Reopen doors when car is designated for loading. Provide "heavy door/variable air pressure" feature for consistent specified door operation within appropriate speed and inertia limits.
- H. Standby Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum 5-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operating panel.
- I. Standby Power Operation
1. Upon loss of normal power, adequate standby power will be supplied via building electrical feeders to simultaneously start and run one car in each group and single cars at contract car speed and capacity.
  2. Automatically return one car at a time in each group and single car, nonstop to designated floor, open doors for approximately 3.0 seconds, close doors, and park car. During return operation, car and hall call pushbuttons shall be rendered inoperative. As each car parks, system shall immediately select the next car until all cars in a group have returned to the designated floor. If a car fails to start or return within 30 seconds, system shall automatically select the next car in the group to automatically return.
  3. When all cars in a group have returned to the designated floor, one car in each group shall be designated for automatic operation. When a service demand exists for 30

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seconds and designated car fails to start, next available car in the group shall be automatically selected for operation.

4. Contactor to provide signal wire and connectivity from Automatic Transfer Switch to the elevator controller for emergency standby power. Test for proper operation.
- J. Card/Proximity Reader Security System: Provide provisions inside car operating panel for reader unit. Mount reader (if provided) behind tinted screen and cross connect from car pushbuttons to control module in machine room. If no reader is currently utilized or provided as part of this project, label spare wires for future reader in car operating panel and controller in machine room.

## 2.05 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in existing machine room spaces and in accordance with CODE.
- B. Pump Unit: Assembled unit consisting of positive displacement pump, induction motor, Maxton master-type control valves combining safety features, holding, direction, bypass, stopping, manual lowering functions, shut off valve, oil reservoir with protected vent opening, oil level gauge, outlet strainer, MEI Silencer, all mounted on CE Acoustic isolating pads. Provide soft start with closed transition. Design unit for a minimum 80 upstarts per hour. Unit must be designed and installed to prevent any noise and vibration being emitted into occupied building spaces. The unit must be designed and installed to ensure performance requirements outlined in the specification package are achieved. The pump unit should be installed a minimum of three (3) inches away from any machine room wall.
- C. Landing Systems: Solid-state, magnetic, or optical type.
- D. Controller: UL/CSA labeled.
  1. Motion Control Engineering (MCE) – H2000
  2. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
  3. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high inductive currents shall be provided with arc deflectors or suppressors.
  4. Microprocessor-Related Hardware
    - a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
    - b. Provide power supplies with noise suppression devices.
    - c. Isolate inputs from external devices, such as pushbuttons, with opto-isolation modules.
    - d. Design control circuits with one leg of power supply grounded.
    - e. Safety circuits shall not be affected by accidental grounding of any part of the system.
    - f. System shall automatically restart when power is restored.
    - g. System memory shall be retained in the event of power failure or disturbance.
    - h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.
  5. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.
  6. Permanently mark components, relays, fuses, PC boards, etc., with symbols shown on wiring diagrams.

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- E. Muffler: Provide New MEI Silencer and properly charge.
- F. Piping and Oil: Retain existing piping and provide new oil for the system. Where existing piping cannot be retained due to location, design or condition, provide new with victaulic fittings. Should any Victaulic fittings or oil lines leak oil, replace with new.
- G. Shutoff Valve: Provide New.

2.06 HOISTWAY EQUIPMENT

- A. Guide Rails: Retain main guide rails in place.
  - 1. Clean rails and brackets. Remove rust.
  - 2. Check all rail and bracket fastenings and tighten.
  - 3. Realign rails as required to provide smooth car ride.
  - 4. Provide supplemental rail brackets and/or backing as required by code or to enhance car ride quality.
- B. Buffers: Retain existing.
- C. Pit Ladder: Retain Existing. Alter as needed to ensure code compliance.
- D. Hydraulic Jack Assembly: Retain existing.
  - 1. Cylinders: Retain existing. Replace packing seal.
- E. Terminal Stopping: Provide normal and final devices. Provide emergency terminal speed limiting devices.
- F. Electrical Wiring and Wiring Connections:
  - 1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the machine room. Provide 5 pair of spare shielded communication wires in addition to those required to connect specified items. Tag spares in machine room.
  - 2. Conduit: Retain existing conduit where feasible. All other times provide galvanized steel conduit, EMT, or duct. Conduit size, 1/2". Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
  - 3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway.
  - 4. Auxiliary Wiring: Connect fire alarm initiating devices, emergency two-way communication system, firefighters' phone jack where present, in each car controller in machine room.
  - 5. Provide CCTV wiring for future camera installation within elevator.
- G. Entrance Equipment:
  - 1. Door Hangers: Retain Existing. Provide New neoprene rollers.
  - 2. Door Tracks: Retain Existing. Tighten all fasteners.
  - 3. Door Interlocks: Provide New.
  - 4. Door Closers: Provide New Closures. Design and adjust to insure smooth, quiet mechanical close of doors.
  - 5. Hoistway Door Unlocking Device: Provide New. Provide unlocking device with escutcheon in door panel at all floors, with finish to match adjacent surface.

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- H. Hoistway Access Switches: Mount in most cost effective location.

2.07 HOISTWAY ENTRANCES

- A. Frames: Provide New Braille and strike jamb bumpers. Retain existing frames.
- B. Transom Panels: Retain existing.
- C. Door Panels: Retain Existing. Retrofit dual gibs, one at trailing edge and one at leading edge of each panel.
- D. Door Retainers: Verify and provide at top and bottom of doors in accordance with code requirements.
- E. Sight Guards: Retain existing. If sight guard(s) have physical damage, replace new. Facility responsible for painting to match doors.
- F. Sills: Retain Existing. Thoroughly polish and tighten fasteners.
- G. Sill Supports: Retain existing. Check and tighten all fastenings.
- H. Fascia, Toe Guards, and Hanger Covers: Retain existing. Provide where damaged or missing. Check and tighten all fastenings.
- I. Struts and Headers: Retain existing. Check and tighten all fastenings. Remove any rust and paint all headers flat black with rust preventative paint.

2.08 CAR EQUIPMENT

- A. Frame: Retain Existing. Check and tighten all fastenings.
- B. Platform: Retain existing. Reinforce if required. Check and tighten all fastenings.
- C. Platform Apron: Provide new extended platform apron per code. Minimum 14 gauge steel, reinforced and braced to car platform for all car openings.
- D. Guide Shoes: Provide New. Solid type with renewable oilless inserts.
- E. Sills: Retain existing. Clean and polish. Check and tighten all fastenings.
- F. Doors: Retain Existing. Adjust for proper door clearances in accordance with code requirements.
- G. Door Hangers: Provide New. Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
- H. Door Track: Provide New. Bar or formed, cold-drawn removable steel track with smooth roller contact surface.
- I. Door Header. Retain existing and modify as needed.
- J. Door Electrical Contact: Provide New. Prohibit car operation unless car door is closed.

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- K. Door Clutch: Provide New. Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.
- L. Restricted Opening Device: Provide New. Provide means for restricting door opening per code requirements if existing means cannot be retained. Plunger type restrictors not acceptable.
- M. Door Operator:
  - 1. Provide New GAL MOVFR11
- N. Door Control Device:
  - 1. Infrared Reopening Device: Provide new Janus Pana 40.
  - 2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0 - 25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. A ctivation of the door open button shall override nudging operation and reopen doors.
  - 3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0 - 1.5 seconds after beams are reestablished.
  - 4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
    - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
    - b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.
- O. Car Operating Panel:
  - 1. PROVIDE INNOVATION WITH PB35 LED BLUE ILLUMINATED BUTTON
  - 2. One car operating panels with faceplates, consisting of a metal box containing the specified operating fixtures, mounted behind the car stationary front return panel. Faceplates shall be hinged and constructed of stainless steel, satin finish.
  - 3. Suitably identify floor buttons, alarm button, door open button, door close button with SCS, Visionmark, or Entrada cast tactile symbols recessed flush mounted. Configure plates per local building code accessibility standards including Braille. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency push-to-call button and alarm button.
  - 4. Provide minimum 3/4" diameter flush floor pushbuttons which illuminate to indicate call registration.
  - 5. Provide alarm button to ring bell located on car. Illuminate button when actuated.
  - 6. Provide keyed stop switch at bottom of car operating panel in locked car service compartment. Mark device to indicate "run" and "stop" positions.
  - 7. Provide "door open" button to stop and reopen doors or hold doors in open position.
  - 8. Extended Door Hold Open Button: Provide button to extend normal door hold open period up to 30 seconds. Cancel extended time by registration of car call or actuation of door close button. When activated, illuminate the door hold open button and the door close button. Cancel the hold open time when the door close button is activated. If a hall call is entered at another floor, sound a buzzer to indicate call waiting is activated.
  - 9. Provide "door close" button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters' operation.
  - 10. Provide firefighters' locked box as required by code.



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11. Provide firefighters' Phase II key switch with engraved instructions filled red. Include light jewel, audible signal, and call cancel button. Locate in locked cabinet in accordance with code requirements.
  12. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate. Inside surface of door shall contain an integral flush window for displaying the elevator operating permit.
  13. Security: Provide 4" x 4" tinted plexiglass for security reader unit. Locate above pushbuttons.
  14. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
    - a. Inspection switch.
    - b. Light switch.
    - c. Three-position exhaust blower switch.
    - d. Independent service switch.
    - e. Constant pressure test button for battery pack emergency lighting.
    - f. 120-volt, AC, GFCI protected electrical convenience outlet.
    - g. Card reader override switch (for future card reader installation)
    - h. Stop switch.
  15. Provide black paint filled (except as noted), engraved, or approved etched signage as follows with approved size and font:
    - a. Phase II firefighters' operating instructions on main operating panel above corresponding keyswitch filled red.
    - b. Car number
    - c. "No Smoking" with symbol
    - d. Car capacity in pounds
- P. Car Top Control Station: Provide New with ENABLE function. Mount to provide safe access and utilization while standing in an upright position on car top.
- Q. Work Light and Duplex Plug Receptacle: Provide New
  1. GFCI protected outlet at top and bottom of car.
  2. Provide a minimum of 10 foot candle of lighting on entire car top.
  3. Include on/off switch and lamp guard.
- R. Car Top Ventilation Fan: Retain existing. If not operational at time of inspection or consultant review, replace new with comparable model.
- S. Car Top Handrail: Provide code compliant car top handrail regardless of maximum distance between car top and hoistway. Make every effort to isolate noise and vibration from being transmitted from handrail to cab interior.
- T. Communication System:
  1. "HELP" two-way communication instrument in car with automatic dialing, tracking, and recall features with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with minimum two numbers.
    - a. "HELP" button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase "HELP" engraved signage adjacent to button.
    - b. Provide "HELP" button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.
  2. Provide emergency phone line operability detection system with audible tone and visual signal as required by code.

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2.09 CAR ENCLOSURE

- A. Car Enclosure:
1. Provide modification as needed to accept new pushbutton and signal fixtures.
  2. Provide modification as needed to accept new pushbutton and signal fixtures.
  3. Ceiling: Provide new LED down light ceiling faced with 20ga. satin stainless steel (Type 304). Ceiling face to be divided into a minimum of six (6) sections separated by 1/4" wide black painted reveals. Each section to contain an individual light fixture. Each fixture to contain a black trim bezel and Eye Beam LED bulbs to comply with code. Edge to be painted black to match ceiling reveals. Included is a low voltage driver unit to be mounted on car top. Emergency escape hatch shall be incorporated into ceiling based on existing location of escape hatch in elevator canopy and shall have hairline joints in ceiling finish. Edge of ceiling to be held approximately 1" from transom & centered between side walls. Lighting shall achieve code compliant foot candles and be protected from breakage.
  4. Shell: Retain existing.
  5. Canopy: Retain existing.
  6. Return Panel, Transoms, Strike Jamb, Entrance Columns, Car Doors: Re-clad existing stainless finishes in new satin stainless and provide cutouts for signal and car operating fixtures. Delaminate surfaces as needed to ensure proper adhesion of new cladding and proper clearance and fitment.
  7. Base: Stainless steel with concealed ventilation cutouts.
  8. Interior Wall Finish: Provide flat laminate to side walls. Laminate shall be Wilsonart Antique Brush #4823-60 or equal. All material to be treated to meet Flame Spread and Smoke Density code requirements.
  9. Handrails: Minimum 1-1/4" diameter stainless steel flat grab bar with returned ends across side walls. Provide standoffs with threaded set pins.
  10. Flooring: Remove existing flooring taking all measures to prevent damage to existing subflooring. Furnish and install new Armstrong Migrations T3513 and 1/8" underlayment.
  11. Elevator Contractor to provide all door adjustment for proper clearances.

2.10 HALL CONTROL STATIONS

- A. Provide 1 riser with flush mounted faceplate in satin stainless finish. Include pushbuttons for each direction of travel which illuminate to indicate call registration. Provide any cutting and patching required. Pushbuttons shall match car station.
- B. Provide all applicable Fire Recall and Emergency Signage via separate stainless steel plate or integral with pushbutton fixture riser.
- C. Provide emergency power and telephone operability indicators in accordance with code integral with lobby hall station.

2.11 SIGNALS

- A. Car Position Indicator: Alpha-numeric Blue digital indicator containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel. Mount fixture in each car operating panel.
- B. Car Lantern: Provide flush-mounted Blue digital car lantern in car entrance column where existing lantern is located, ensure coverage of existing hole. Illuminate up or down LED

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lights and sound electronic tone once for up and twice for down direction travel as doors open. Sound tone once for up direction and twice for down direction. Sound level shall be adjustable from 0 - 80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor. Provide adjustable car door dwell time to comply with ADA requirements relative to hall call notification time.

- C. Faceplate Material and Finish: Satin Stainless Steel
- D. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.

PART 3 EXECUTION

3.01 SITE CONDITION INSPECTION

- A. Prior to beginning installation of equipment, examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
- B. Do not proceed with installation until work in place conforms to project requirements.

3.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in Contractor's original, unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
- C. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.

3.03 INSTALLATION

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install machine room equipment with clearances in accordance with referenced codes and specification.
- C. Install all equipment so it may be easily removed for maintenance and repair.
- D. Install all equipment for ease of maintenance.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- F. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
  - 1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.
  - 2. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

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3.04 FIELD QUALITY CONTROL

- A. Work at jobsite will be checked during course of installation. Full cooperation with reviewing personnel is mandatory. Accomplish corrective work required prior to performing further installation.
- B. Have Code Authority acceptance inspection performed and complete corrective work.

3.05 ADJUSTMENTS

- A. Install hydraulic jack assembly and guide rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure guide rail joints without gaps and file any irregularities to a smooth surface.
- B. Static balance car to equalize pressure of guide shoes on guide rails.
- C. Lubricate all equipment in accordance with Contractor's instructions.
- D. Adjust motors, valves, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.06 CLEANUP

- A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.
- B. Remove all loose materials and filings resulting from work.
- C. Clean machine room equipment and floor.
- D. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.
- E. Painting:
  - 1. Black: Pit Support Channel, buffers, car frame and crosshead.
  - 2. Grey: Machine room flooring, pit flooring, pit walls from floor to 6 feet off floor and car top
  - 3. White: Machine room walls from floor to ceiling.

3.07 ACCEPTANCE REVIEW AND TESTS

- A. See Section 01 77 00 – Closeout Procedures.

3.08 PURCHASER'S INFORMATION

- A. See Section 01 77 00 – Closeout Procedures.

END OF SECTION 14 24 00

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SECTION 23 05 00  
COMMON WORK RESULTS FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.1 ARTICLES INCLUDED

- A. Definitions.
- B. Permits, Fees and Notices.
- C. Applicable Publications.
- D. Code Compliance.
- E. Scope of Work.
- F. Record Drawings.
- G. Intent of Drawings and Specifications.
- H. Quality Assurance
- I. Submittals.
- J. Product Requirements, Equals and Substitutions.
- K. Manufacturers Instructions.
- L. Transportation and Handling.
- M. Storage and Protection.
- N. Cutting, Patching and Demolition.
- O. Cleaning Up/Removal of Debris.
- P. Starting of Mechanical Systems.
- Q. Operating and Maintenance Manuals.
- R. Training of Owners Operators.
- S. Guarantee of Work.
- T. System Testing.

1.2 ARTICLES

- A. Definitions:

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1. The term "As indicated" means as shown on drawings by notes, graphics or schedules, or written into other portions of contract documents. Terms such as "shown", "noted", "scheduled" and "specified" have same meaning as "indicated", and are used to assist the reader in locating particular information.
  2. The term "Provide", means furnish and install as part of the work covered in Division 23.
  3. The term "Furnish" means furnish only, for installation, as part of this contract, by other Divisions.
  4. The term "Install only" means to install under the work of Division 23 equipment furnished by other Divisions, or by the Owner.
  5. The term "Owner's Representative" when referenced herein shall be the Architect or the Engineer acting as his designated representative unless otherwise noted.
  6. The term "design" as it pertains to the work of this division shall describe the basic intent, component sizing, component relationships and overall architecture of the plumbing system. The design is generally schematic in nature and will require specific detailing after the accepted products are determined.
  7. The term "detail" as it pertains to the work of this division shall describe the work required by the contractor to assure a fully coordinated installation of the material and equipment supplied. When requested, the contractor shall produce detailed shop drawings or sketches indicating the actual placement of the equipment or material supplied; also including how the equipment or material interfaces with work of other sections or divisions within the contract documents.
  8. The term "workman-like manner" as it pertains to the work of this division shall describe a neat well organized high quality installation system (duct, pipe, control wire or tube, conduit, etc.). Routing shall be well thought out providing adequate service clearance and maximum use of space. Equipment placement shall exhibit proper clearances for service. All lines (duct, pipe, control wire or tube, conduit, etc.) shall be run straight and true, parallel or perpendicular to building structure neatly supported.
- B. Permits, Fees and Notices: Comply with the Division 01 Requirements.
- C. Applicable Publications:
1. Publications listed in each Section form a part of that Section to the extent referenced.
  2. When a standard is specified by reference, comply with requirements of that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
  3. The Publication or Standard is the publication in effect as of the bid date, except when a specific date is listed.
- D. Code Compliance:
1. Life Safety Code - NFPA 101 2012 Edition
  2. Florida Building Code 5<sup>th</sup> Edition (2014) Building
  3. Florida Building Code 5<sup>th</sup> Edition (2014) Mechanical
  4. Florida Building Code 5<sup>th</sup> Edition (2014) Existing Building
  5. Florida Building Code 5<sup>th</sup> Edition (2014) Accessibility
  6. Florida Fire Prevention Code 5<sup>th</sup> Edition (2014)
- E. Scope of Work: The work to be performed under this Division consists of the satisfactory completion of all HVAC as indicated in the Contract Documents.
- F. Record Drawings: Comply with the Division 01 Requirements.

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G. Intent of Drawings and Specifications:

1. The intent of the drawings and specifications is to establish minimum acceptable quality standards for materials, equipment and workmanship, and to provide operable mechanical systems complete in every respect.
2. Existing conditions, dimensions, etcetera, depicted on the drawings are taken from the "as-built" drawings of the original construction supplemented by field observation. The contractor is cautioned to field verify all existing conditions, dimensions, etcetera, notifying the Owner's Representative of any discrepancies other than those minor in nature, for direction, prior to ordering or fabricating equipment or materials. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawing and specifications, the more stringent shall govern, unless the discrepancy conflicts with applicable codes, wherein the code shall govern.
3. The drawings are diagrammatic, intending to show general arrangement, capacity and location of system components, and are not intended to be rigid in detail. Final placement of equipment, other system components, and coordination of all related trades shall be the contractor's responsibility.
4. Due to the small scale of the drawings, and to unforeseen job conditions, all required offsets and fittings may not be shown but shall be provided at no additional change in contract cost.
5. In the event of a conflict, the Owner's Representative will render an interpretation in accordance with the Division 01 requirements.

H. Quality Assurance:

1. All equipment furnished under this Division shall be listed and labeled by U.L., ETL or a nationally recognized testing laboratory (NRTL).
2. Material furnished under this Division shall be standard catalogued products of recognized manufacturers regularly engaged in the production of such material and shall be the latest design.
3. Materials shall be the best of their respective kinds. Materials shall be new except where the specifications permit reuse of certain existing materials.
4. Work provided for in these specifications shall be constructed and finished in every part in a workmanlike manner.
5. All items necessary for the completion of the work and the successful operation of a product shall be provided even though not fully specified or indicated on the drawings.
6. All work to be performed by qualified and experienced personnel specifically trained in their respective field.
7. All work of this division shall be carefully interfaced with the work of other divisions to assure a complete, functioning system or systems.

I. Submittals: Comply with the Division 01 Requirements.

J. Product Requirements, Equals and Substitutions: Comply with the Division 01 Requirements.

K. Manufacturer's Instructions:

1. Installation of work shall comply with manufacturer's printed instructions.
2. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Owner's Representative for clarification. Do not proceed with work without clear instructions.

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- L. Transportation and Handling: Comply with the Division 01 Requirements.
- M. Storage and Protection:
  - 1. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
  - 2. Store products to prevent damage by the elements. Space temperature shall be controlled as required to prevent condensation and metal corrosion or damage to electrical or electronic parts are the result of condensation.
  - 3. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
  - 4. Provide protection as necessary to prevent damage after installation.
  - 5. Products which suffer damage due to improper storage shall not be installed and if found in place, shall be removed and replaced at the contractors expense.
- N. Cutting and Patching: Comply with the Division 01 Requirements.
- O. Cleaning Up/Removal of Debris:
  - 1. Comply with the Division 01 Requirements.
  - 2. Maintain a clean work area. Construction debris shall be immediately removed from all newly erected work.
- P. Starting of Mechanical Systems:
  - 1. Provide material and labor to perform start-up of each respective item of equipment and system prior to beginning of test, adjust and balance procedures.
  - 2. Provide labor to assist the Owner's Representative in acceptance review.
  - 3. Provide point by point system check-out. Submit results in tabulated form by system. Include this data as part of Operation and Maintenance Manuals.
  - 4. Provide information and assistance and cooperate with test, adjust and balance services.
  - 5. Comply strictly with manufacturer's recommended procedures in starting up mechanical systems.
  - 6. Provide such periodic continuing adjustment services as necessary to ensure proper functioning of mechanical systems until acceptance and up to 1 full year after date of Owner acceptance.
- Q. Operating and Maintenance Manuals: Comply with the Division 01 Requirements.
- R. Training of Owners Operators:
  - 1. The owners shall be given comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of equipment.
  - 2. The contractor shall be responsible for scheduling the training which shall start with classroom sessions followed by hands on training on each piece of equipment. Hands on training shall include start-up, operation in all modes possible, shut-down and any emergency procedures.
  - 3. The manufacturer's representative shall provide the instructions on each major piece of equipment. These sessions shall use the printed installation, operation and maintenance instruction material included in the O&M manuals and shall emphasize safe and proper operating requirements and preventative maintenance.



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S. Guarantee of Work:

1. Comply with the Division 01 Requirements.
2. Where applicable, furnish manufacturer's written warranty for materials and equipment.
3. Insert warranties in appropriate locations in operating and maintenance manuals.
4. Materials and equipment having seasonal operation limitations, shall be guaranteed for a minimum of one year from date of seasonally appropriate test, and acceptance in writing by the Owner, unless specific Division 23 specifications specify a longer period.

T. System Testing:

1. Provide all necessary labor, materials and equipment to successfully complete all system testing necessary for building occupancy and owner acceptance.
2. Provide all necessary labor, materials and equipment to assist contractors of other division to complete system testing necessary for building occupancy and owner acceptance, wherever an inter-relationship between Division 23 and the work of other divisions exists.
3. Tests shall be repeated as necessary until all occupancy and operation permits are granted and the owner accepts the project.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 23 05 00

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SECTION 23 05 10  
BASIC MATERIALS AND METHODS OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Fire and smoke stopping. (Refer to Division 07)
- B. Electrical requirements. (Refer to Division 26)
- C. Painting. (Refer to Division 09)
- D. Concrete work.
- E. Placing of equipment.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this Section to the extent referenced.
  - 1. American Institute of Steel Construction (AISC) Publications
  - 2. American National Standards Institute (ANSI) Standards
  - 3. American Society for Testing and Materials (ASTM) Publications
  - 4. American Welding Society (AWS) Publications
  - 5. Underwriters Laboratories, Inc. (UL) Standards

1.4 SUBMITTALS

- A. General: Where submittals are required, comply with Division 01 requirements.
- B. Shop Drawings: Submit drawings of fabricated steel supports where proposed supports are not in accordance with details on drawings, or where drawings do not detail supports. Submittal for acceptance is required.
- C. Product Data: Submittal for other than fabricated steel supports is not required. Product data for the following shall be included in the operation and maintenance manuals. Submittal for acceptance is not required.
  - 1. Access doors.
  - 2. Waterproofing and flashing material.
  - 3. Fire and smoke stopping material.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Fire and Smoke Stopping Material: (Refer to Division 07 for requirements).

2.2 FABRICATION

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- A. Fire and Smoke Stopping: All work is provided under Division 07.
- B. Electrical Requirements: Product description not applicable to this Section.
- C. Painting: Product specified in Division 09 - FINISHES.
- D. Concrete Work:
  - 1. This contractor to provide detailed dimension drawings, including anchor bolt locations where required for all bases and pads required for equipment furnished under this Division.
  - 2. Concrete for equipment bases and pads shall be 3000 p.s.i. design mix prepared in accord with ASTM C94. Cement shall be in accord with ASTM C150. Aggregate shall be fine sand in accord with ASTM C33. Water shall be clean, fresh, drinkable.
- E. Placing of Equipment: Product description not applicable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation of materials and equipment shall be in accord with the manufacturer's written instructions, except as specified.

3.2 INSTALLATION

- A. Fire and Smoke Stopping: Fire and smoke stopping shall be provided in Division 07.
- B. Electrical Requirements: Refer to Division 26 for electrical requirements.
- C. Painting:
  - 1. All equipment shall be furnished with a factory- applied galvanized, prime paint, or finish paint finish. Touch-up damaged surfaces of equipment immediately.
  - 2. Paint for galvanized surfaces shall be in accordance with ASTM A780 using zinc rich compound.
  - 3. Paint wooden mounting backboards with two coats of gray enamel prior to making attachments to the board.
  - 4. For quality control refer to DIVISION 09 - FINISHES.
  - 5. Remove all dirt, rust, scale, grease, pipe dope, solder flux, and welding slag from all surfaces to be painted.
  - 6. Paint immediately, under this Division, all damaged galvanized surfaces. Paint galvanized metal surfaces behind grilles with two coats of flat black paint.
  - 7. Apply rust inhibitive primer to ferrous surfaces of shop fabricated steel supports.
  - 8. Paint immediately under this division all field and shop welded joints in piping or equipment supports with 2 coats of grey metal primer.
- D. Concrete Work:
  - 1. Concrete pads and curbs for supports of equipment shall be a minimum of 4" high with chamfered edges and sized for approved equipment.
  - 2. Surfaces of concrete shall be troweled smooth. When forms are removed, fill voids with cement and rub smooth with rubbing stone.
  - 3. Do not pour concrete when ambient temperature is less than 40°F, and falling.

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E. Placing of Equipment:

1. Coordinate setting of equipment with the requirements of other trades so as to avoid conflicts and to insure compatibility. Equipment shall not block access for installation of other equipment.
2. All air handling units shall have code required and manufacturer required clearances around all equipment.
3. Set base mounted equipment on permanent and finished supports. Temporary support, if any, shall be removed prior to making final pipe, duct, or electrical connections to equipment.
4. Adjust suspended equipment to final elevation prior to making pipe, duct or electrical connections.
5. Exercise caution during equipment placing operations to insure that structure is not overloaded.
6. Do not move heavy equipment across floor or roof of insufficient load bearing capacity to support such equipment. Provide bracing or shoring as required, or use crane to place equipment directly on permanent and finished support.

END OF SECTION 23 05 10

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SECTION 23 05 18  
CONTROL WIRING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 26 for electrical wiring requirements.

1.2 WORK INCLUDED

- A. Building Control System Wiring.
- B. Interior & Exterior Lighting Control Wiring

1.3 DEFINITIONS

- A. Control Wiring: All wiring, high or low voltage other than power wiring, required for the proper operation of the mechanical systems.
- B. Power Wiring: All line voltage wiring to the mechanical equipment. Line voltage which also serves as a control circuit, such as a line voltage thermostat, or involves interlocking with a damper, shall be considered control wiring.

1.4 QUALITY ASSURANCE

- A. All work will be in accordance with the requirements of the National Electrical Code.

1.5 SUBMITTALS

- A. Submittals are not required.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All material used in the completion of the wiring under this section will comply with the requirements of Division 26 Electrical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Cooperate completely with the contractor for Division 26.
- B. Provide all conduit, wire and accessories necessary to complete the control wiring as specified under WORK INCLUDED.
- C. Because of variations in requirements from manufacturer to manufacturer, all details may not be included in the Contract Documents. This sub-contractor must obtain approved coordinated wiring diagrams before proceeding with the control wiring.
- D. All control wiring shall be properly installed in an approved raceway system or when

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allowed, run exposed in concealed spaces. All control wiring run in exposed areas shall be in an approved raceway unless otherwise noted.

- E. Control wire run exposed shall be neatly bundled and routed parallel and/or perpendicular to building structure or equipment casing. Routing of wire shall be so that it does not interfere, chafe or obstruct service or maintenance of the equipment served.
- F. Exposed control wire shall be properly secured and/or supported within equipment enclosures. Cable shall be secured on no greater than 18" centers.
- G. All openings made for the passing of control wire shall be properly bushed to prevent chafing. Hole size shall be suitable for the quantity of wires or tubing passing through while allowing for ease of pulling and future expansion. Oversized holes beyond these requirements are not allowed.
- H. Holes made within air handling equipment which may allow the transfer or bypassing of air shall be properly sealed after wire is pulled. Expanding foam sealant and proper backing material will be acceptable. Seal shall be suitable for maximum unit operating pressures.
- I. Attachments of control devices, raceway and cable supports shall be made with proper attachments. Self-drilling screws which result in exposed end will not be acceptable. Bolts and nuts shall be used with bolt head exposed to view. All fasteners located where exposed to weather or moisture shall be stainless steel or cadmium plated.
- J. Any opening, holes or cuts in equipment enclosures or building structure not used shall be neatly sealed. On equipment, the seal or patch shall be of similar material sealed and painted to match.
- K. The control contractor shall clean all unused or scrap material from the equipment enclosure.
- L. All control wire shall be identified by proper cable identification methods. Verify how cables shall be labeled with the Owner's Representative prior to the start of work. All termination shall be labeled and labels clearly visible.
- M. All control devices, cabinets, equipment and raceways shall be labeled. Verify how the hardware shall be labeled with the Owner's Representative prior to the start of work.
- N. Splices in control wire are not allowed unless the length of run is too great to allow for a continuous run. When splices become necessary, they shall be solder connected with heat shrink tubing. When raceway is used, all splices shall be in junction boxes.
- O. Control devices (i.e., flow switches), connected to cold equipment where the possibility of condensation may occur shall be vaporproof type. The connecting conduit shall be properly sealed with spray type foam after the wires are pulled through. If this is not possible, a weatherproof junction box shall be close mounted to the device to allow for proper moisture sealing. Conduit connections shall be sealed with a silicon type caulk/sealant.
- P. All control devices or wiring located exposed to weather or moisture shall be in an approved raceway system. This system shall be properly supported and sealed to prohibit moisture convection or transfer. Provide flexible conduit similar to seal tight for connection to all equipment. EMT and set screw fittings are not acceptable. All exterior raceway shall be IMC (Intermediate Metallic Conduit) or better with threaded fittings.

END OF SECTION 23 05 18

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SECTION 23 05 53  
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Piping and equipment identification.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated
  - 1. Piping and equipment identification.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Piping and Equipment Identification:
  - 1. Communications Technology Corp.
  - 2. Craftmark Identification Systems, Inc.
  - 3. EMED Co., Inc.
  - 4. Florida Marking Products, Inc.
  - 5. Marking Services, Inc.
  - 6. Seton Name Plate Corp.
  - 7. W.H. Brady Co., Signmark Division

2.2 FABRICATION

- A. Equipment Identification:
  - 1. Equipment nameplates:
    - a. Indoor: Shall be 1/16 inch thick plastic with black satin surface and white core. Lettering shall be engraved through the surface color to expose the core color. Plate size shall be a minimum of 2-1/2 inch by 4 inch, with 3/4 inch high lettering for equipment and 3/4 inch by 2-1/2 inch, with 3/16 inch high lettering for ceiling grid labeling. Equipment identifying name and number shall be in accord with schedules on the Contract Documents. Plate manufacturer shall furnish pre-drilled hole locations for pop riveting. Where pop riveting is not suitable, a suitable adhesive for permanently attaching plate to equipment shall be provided.
    - b. Outdoor: Shall be 125 Mil rigid plastic constructed of printed legend sealed between two layers of chemically-resistant plastic to resist ultraviolet damage. Plate size shall be a minimum of 2-1/2 inch by 4 inch, with 3/4 inch high lettering for equipment. Equipment identifying name and number shall be in accord with schedules on the Contract Documents. Plate manufacturer shall furnish pre-drilled hole locations for pop riveting. Where pop riveting is not suitable, a suitable adhesive for permanently attaching plate to

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equipment shall be provided.

PART 3 - EXECUTION

3.1 GENERAL

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 INSTALLATION

A. Equipment Identification:

1. Permanently affix nameplate to each item of equipment using stainless steel pop rivets. Where irregular surface impede direct attachment of plates, affix plate to sheet metal bracket and attach bracket to equipment with screws, bolts or suitable adhesive from nameplate manufacturer.
2. Refrigeration System - Additional Requirements:
  - a. Marking and Signage:
    - (1) Provide a permanent sign containing the following information:
      - (a) Name and address of installer.
      - (b) Kind of refrigerant.
      - (c) Lbs. of refrigerant.
      - (d) Field test pressure applied.
    - (2) Provide a permanent sign: Main electrical supply, i.e., main compr. disc.
    - (3) Provide metal tags with 0.5" letters:
      - (a) Shut-off valves to each vessel, i.e., L.P. receiver shut-off.
      - (b) Relief valve.
    - (4) Piping shall be marked as either:
      - (a) Refrigerant - High Pressure - Liquid or Hot Gas.
      - (b) Refrigerant - Low Pressure - Suction, Pumped Liquid Supply or Pumped Liquid Return.

END OF SECTION 23 05 53



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SECTION 23 07 00  
HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Piping Systems Insulation.
- B. Accessories.

1.3 QUALITY ASSURANCE

- A. All products within the conditioned air stream or active plenums shall comply with the NFPA 90A Flame/Smoke rating of 25/50 and comply with UL 181 erosion limitations. Fire hazard ratings shall be as determined by NFPA-255, "Method of Test of Surface Burning Characteristics of Building Materials" - ASTM E84 or UL 723.
- B. All adhesives, cements, finishes, jackets, etc., shall be U L listed or labeled for use as applied to insulation and designed specifically for use in the installation.
- C. All insulation shall be installed in accordance with National Commercial & Industrial Insulation Standards (NCIA).

1.4 SUBMITTALS

- A. Submit schedule indicating type of insulation, thickness, vapor barrier or coating by system and size.
- B. Product data, along with installation operation and maintenance instructions, shall be included in the operation and maintenance manuals.
- C. Submit details of insulated removable covers using the actual equipment dimensions, concrete base sizes and piping arrangements.

1.5 GENERAL REQUIREMENTS

- A. Factory-applied insulation is specified under the applicable equipment Section of these specifications. It is listed here for reference only.
- B. Packages and standard containers of materials shall be delivered unopened to job site and shall have the manufacturer's label attached giving a complete description of the material.

1.6 DEFINITIONS

- A. The term "exposed" means exposed to view in finished spaces, in equipment rooms, in fan rooms, in closets, in utility corridors, in tunnels, on roof, in storage rooms, and in other spaces as indicated.
- B. The term "concealed" means concealed from view, and includes all spaces not defined as exposed.

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- C. The term "unconditioned" space shall mean all places where the temperature surrounding the pipe has not been conditioned consistent with conditioned spaces, and shall include mechanical equipment rooms, non-active ceiling plenums, and non-accessible chases. This term shall also include conditioned spaces where the humidity levels are allowed to rise above 70% RH.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Closed Cell Elastomeric Insulation:

1. Armacell LLC
2. Johns Manville
3. K-Flex

B. Jackets:

1. Southern Asbestos Company
2. John Mansville
3. Owens-Corning Fiberglas

C. Insulation Coatings, Mastics, Adhesives, and Sealants

1. Foster
2. Childers
3. Pittsburgh Corning
4. Armacell

2.2 PIPE INSULATION AND FIREPROOFING REQUIREMENTS – Refer to Construction Documents.

2.3 MATERIALS

A. Pipe Insulation (to 450F):

1. Closed Cell Elastomeric (Small Pipe Sizes up to 5 Inches): Flexible, elastomeric, closed cellular, tubular molded to accommodate piping, smooth outer surface suitable for painting with vinyl lacquer type coating, water resistant, non absorbent, ozone resistant, minimum density of 4 lb/cf, maximum conductivity per 1" thickness of .27 at 75°F mean temperature.

B. Insulation Accessories:

1. Aluminum Pipe Jacket and Fitting Covers: Jacket shall be 0.016" thick (26 gauge) embossed aluminum, sized to provide a 2" (min.) lap joint both longitudinally and circumferentially, with 3/4" min. wide x 0.015" min. (30 gauge) thick draw bands. Fitting covers shall be aluminum, 0.025" (22 gauge), min., thickness.

C. Accessories:

1. Aluminum Pipe Jacket and Fitting Covers: Jacket .016" thick (28 ga.) embossed aluminum sized to provide a minimum 2" lap joint both longitudinal and circumferentially, minimum 3/4 inch x .015 inch thick (30 ga) draw bands. Covers .024 inch thick.
2. PVC pipe jacket and fitting covers used with insulation for pipe, elbows, tees,

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- couplings, 25/50 flame/smoke ratings, suitable for temperatures to 500°F.
3. Closed cell elastomeric insulated finish shall be a white water based flexible, acrylic latex enamel equal to WB Armaflex, Foster 30-64 or approved equal elastomeric finish.
  4. Insulation Tape: Closed cell elastomeric insulation: 2" wide x 1/8" thick.
  5. Elastomeric Insulation Adhesive: Air drying contact adhesive for securing sheets to flat or curved metal surfaces and joining seams and butt joints of elastomeric insulation. Suitable for temperatures to 180F, dried film not to exceed 25 for flame spread and 50 for smoke development when tested per ASTM E 84-84A method. Foster 85-75, Childers CP-82 or Armaflex 520 adhesive or approved equal.
  6. Vapor Barrier Coating: Air drying flexible water based coating used for applying a vapor barrier coating with reinforcing mesh at all below ambient piping/equipment insulated elbows, fittings, and valves. All vapor retarder film (ASJ) seams on below ambient piping/equipment shall also be vapor sealed with vapor barrier coating. Suitable for temperatures to -20F and 180°F, dried film not to exceed 25 for flame spread and 50 for smoke development when tested per ASTM E 84-84A method. Maximum Perm rating of 0.08 as tested by ASTM E96, Procedure A at 45 mils dry. Childers CP-34 Vapor Retardant coating, Foster 30-65 Vapor Fas® Coating, Marathon Industries, Inc. 590 LO -PERM, Vimasco Corp. 749 Vapor-Blok, or approved equal.
  7. Insulation Joint Sealant: Fire- and water-resistant, flexible, sealant. Used in all cellular glass joints on below ambient piping/equipment. Childers CP-76 Chil Byl, CP-70 Chil Joint, Foster 95-50 Flextra, Foster 30-45 Foamseal, Pittsburgh Corning 444 or approved equal.
  8. Acrylic Finish and Vapor Barrier Coatings:
    - a. Elastomeric Insulations: acrylic coating, air drying flexible water based finish used for finishing flexible elastomeric insulation. Suitable for coating temperatures to 200°F, dried film not to exceed 25 for flame spread and 50 for smoke development when tested per ASTM E 84-84A method. Armacell LLC WB Armaflex or Foster 30-64 elastomeric finish or approved equal.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Install all insulation in strict accordance with the manufacturers written installation instructions.
- B. All insulation work shall be performed by skilled mechanics regularly engaged in the insulation trade.
- C. Properly coordinate the insulation work with the other trades so that installation is performed with a minimum of conflict.
- D. Insulation shall not be applied on any piping system requiring testing until testing is completed and approved by Owner's Representative.
- E. Insulation shall not be applied until all systems are clean, dry, free of dirt, dust or grease.
- F. The finished installation shall present a neat and acceptable appearance which includes but is not limited to: all jackets smooth, all vapor barriers sealed properly, no evidence of "ballooning" of the jackets, or sagging insulation, all valves, dampers, gauges, unions, etc. accessible. The Owner's Representative shall be the final judge of acceptance of workmanship.

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- G. All equipment nameplates on hot equipment shall be left uncovered. All equipment nameplates on cold equipment shall have a removable section sized to expose the nameplate. This section shall be clearly marked "NAMEPLATE".
- H. If proper maintenance procedures require access to the insulated equipment removable panels, sections or covers shall be provided to accomplish this. These access devices shall be constructed in a manner to assure easy access and sturdy construction. The contractor shall assume the responsibility to coordinate all equipment requiring insulation to be either factory or field insulated.
- I. Insulation and accessories shall be applied only at suitable application temperature and conditions as recommended by the manufacturer. Do not apply insulation to any surface while it is wet.
- J. Insulation shall be protected from moisture and weather during storage and installation.
- K. Insulation which has sustained moisture damage, torn jackets, or other damage due to improper storage or other reasons shall not be used. If evidence of this is sighted the Owner's representative reserves the right to require the insulating contractor to remove any and/or all insulation until the Owner's Representative is satisfied that there is no longer any inferior insulation installed on this project.
- L. Insulation, fabric and jacketing shall be protected from damage during construction. Damage by the insulator shall be repaired without cost to the Owner. Damage by others shall be reported in writing to the contractor.
- M. The insulation subcontractor is responsible for proper material storage at the work site.
- N. Work performed prior to receipt of approved documents or submittals, which later proves to be incorrect or inappropriate, shall be promptly replaced by the contractor without cost to the purchaser.
- O. Insulation shall not be installed until adequate access and clearances at control mechanisms, dampers, sleeves, columns and walls have been provided.
- P. All insulation at handholes, access doors or other openings, and adjacent to flanges and valves shall be neatly finished where exposed to view.
- Q. Where an insulated pipe passes through a sleeve or opening in a non-rated partition, the full specified thickness of the insulation shall pass through the sleeve or opening. Where an insulated pipe passes through a rated partition, the insulation shall be stopped at the partition. The void between the pipe and the sleeve shall be sealed with an approved fire-stopping material, and the insulation trimmed and sealed to the partition sufficient to cover the sleeve.
- R. All materials, accessories and methods of installation and fabrication are subject to the Owner's Representatives inspection and approval during any phase of the work.
- S. The insulation subcontractor shall prevent the accumulation of insulation debris in the buildings and on the premises of the Owner.
- T. The insulation subcontractor shall be responsible for his own safety program at the work site, and shall provide instruction on safe practices for his workers assigned to the project. All employees are subject to the work rules at the job site.
- U. The insulation subcontractor shall familiarize himself with the progress and execution of the

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job and notify the proper parties of interferences and any problems with the proper installation of his materials.

3.2 INSTALLATION

A. Pipe Insulation:

1. General:

- a. A complete moisture and vapor barrier shall be installed wherever insulation is penetrated by hangers or other projections through insulation and in contact with cold surfaces for which a vapor seal is specified.
- b. Cover fittings, flanges, unions, valves, anchors, and accessories with premolded or segmented insulation of the same thickness and material as the adjoining pipe insulation. Apply vapor barrier coating and reinforcing mesh in two coats to a minimum dry thickness of 32 mils on all below ambient piping. Where nesting size insulation is used overlap pipe insulation 2 inches or one pipe diameter. Fill voids with insulating cement and trowel smooth. Elbows shall have not less than 3 segments per elbow. Secure insulation with wire or tape until finish is applied. Blanket inserts in lieu of premolded or segmented insulation is not allowed. Cover fittings with preformed PVC fitting covers.
- c. Wrap all pressure gauge taps, thermometer wells and all other penetrations through insulation with closed cell insulation tape so as to prevent condensation.
- d. Seal all raw edges of insulation with vapor barrier coating or lagging adhesive.
- e. For piping supported by hangers outdoors, apply a rainshield to prevent water entry.

2. Closed Cell Elastomeric:

- a. All joints shall be sealed with adhesives.
- b. Where the thickness is to be obtained by use of two layers of insulation, install with staggered joints.
- c. Finish:
  - 1) Concealed Indoors: No additional finish.
  - 2) Exposed Indoors: Provide PVC jacket over all insulation.
  - 3) Concealed Indoors: Provide PVC jacket over fittings fabricated from insulation sections or sheet.
  - 4) Outdoors: Provide aluminum pipe jacket.

B. PVC Jacket:

1. Provide PVC sheet jacket over all exposed, indoor piping or insulation.
2. Provide PVC pipe jacket over all exposed, indoor elastomeric pipe insulation.
3. Provide PVC fitting covers over all fittings fabricated from insulation sections or sheet material.
4. PVC pipe jacket shall be applied with special attention given to achieving positive seal at all longitudinal and circumferential joints using a welding solvent on the longitudinal joint as recommended by the manufacturer. Slip joints to have 4" minimum lap and no welding solvent.

C. Flexible Acrylic Latex:

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1. Apply two coats to closed cell elastomeric insulation.
2. Refer to Division 09 for color to be used. If no instructions are given, provide a white finish.

3.3 MISCELLANEOUS ITEMS

- A. General: Provide insulation of any portion of a system or piece of equipment not previously discussed where ambient operating conditions will allow condensation to occur or whose surface temperature exceeds 115°F. Insulation materials and method shall be as directed by the Designer.
- A. Final Inspection: At final inspection, the finished surfaces of all exposed insulation shall be clean and without stains or blemishes. Repair and clean the insulation surfaces and, if necessary, to obtain a new appearance, shall coat discolored surfaces with off-white latex water-base semi-gloss paint or lagging adhesive, without a change in the contract price.

END OF SECTION 23 07 00

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SECTION 23 23 00  
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Refrigerant (RS/RL/RHG) Piping.
- B. Valves and Specialties

1.3 DEFINITIONS

- A. The pipe sizes given in this document shall be construed as nominal pipe sizes.

1.4 QUALITY ASSURANCE

- A. All material provided under this section shall be standard catalogued products of recognized manufacturers regularly engaged in the production of such products, and shall be of the manufacturer's most recent design that is in regular production.
- B. Each item provided under this section shall meet the requirements for that item as installed and used, in accordance with the following standards:
  - 1. Metallic Piping Systems employing mechanical joints and grooved-end pipe - ASME/ANSI B-31.9
  - 2. Refrigeration Piping and Heat Transfer Components - ASME/ANSI B31.5
  - 3. Safety Code for Refrigeration Systems – ASHRAE 15
  - 4. Refrigerant Containing Components and Accessories – UL 207
- C. Each piping system shall be in accordance with the system design pressures shown in paragraph 2.1 - Materials, this specification section.
- D. All materials provided under this section shall be new, except where the specifications and/or drawings permit the reuse of certain existing materials.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. The work and materials listed in this Section shall be provided in accordance with the standards and requirements set forth in the applicable portions of the latest editions of the referenced publications.
  - 1. American National Standards Institute (ANSI) Standards
  - 2. American Petroleum Institute (API) Specification
  - 3. American Society of Mechanical Engineers (ASME) Publications
  - 4. American Society for Testing and Materials (ASTM) Publications
  - 5. American Welding Society (AWS) Publication
  - 6. American Water Works Association (AWWA) Standards

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8. The Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Publications
9. National Fire Protection Association (NFPA) Standards
10. National Sanitation Foundation (NSF) Testing Laboratory Standards.
11. Plastic Pipe Institute (PPI) Manual.
12. Underwriters Laboratories (UL)

1.6 SUBMITTALS

- A. All submittals shall be made in accordance with Division 01 requirements.
- B. Materials List: Submit a list identifying the specific type of material that will be used for each piping system. Include pipe, pipefittings, valves and joints. Include the basic designation of the publication applicable for each type of material and method.
- C. Refrigeration Piping Requirements: Submit a letter from the refrigeration equipment manufacturer stating that the refrigeration piping system, as shown on the contract documents, is acceptable for the equipment the manufacturer proposes to furnish, or submit drawings prepared by an authorized representative of the refrigeration equipment manufacturer.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Refrigerant (RS/RL/RHG) Piping.  
System Design Pressure: 300 psig.
  1. Piping carrying Refrigerants shall be ACR copper.
  2. ACR Copper Refrigerant Piping:
    - a. Piping, 3" and smaller: T type ACR hard-drawn copper tubing, ASTM B88, ANSI H23.1.
    - b. Fittings, 3" and smaller, all types, wrought copper: ASTM B16.22, ANSI B16.22. All 90° elbows shall be the long radius type.
    - c. Brazing: Contractors Option:
      - (1) 5% silver, 6% phosphorus, balance copper, 1190°F melting point. AWS A5.8 number BCuP -3. J.W. Harris Stay-Silv® 5 or equal.
      - (2) 15% silver, 5% phosphorus, balance copper, 1190°F melting point. AWS 5.8 number BCuP-5. J.W. Harris Stay-Silv® 15 or equal.
      - (3) 6% silver, 6.1% phosphorus, balance copper, 1190°F melting point. QQ-B-654A number BCuP -5. J.W. Harris Dynaflow® 5 or equal.
    - d. Unions used shall be specifically designed for refrigeration piping.

2.2 VALVES AND SPECIALTIES

- A. Solenoid Valves:
  1. Liquid line shut off.
  2. Normally closed.



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3. Manual lift stem.
  4. Pilot operated.
  5. Synthetic seat for permanent tight shut-off.
  6. 120 volt solenoid coil (interchangeable).
  7. Top grade brass, bronze and/or semi-steel body materials.
  8. Acceptable Manufacturers: Sporlan, Alco, Hubbell, Phillips, Henry.
- B. Filter Drier:
1. Replaceable core type.
  2. Heavy steel, cadmium plated with external coat of paint.
  3. All internal parts cadmium plated.
  4. Outlet seal gasket with spring to prevent bypassing.
  5. Copper fittings brazed to steel shell, suitable for soldering with Sil-Fos or Phos-Copper solder.
  6. Molded porous core elements.
  7. Tie rod assembly to permit external assembly with one piece insert.
  8. Bolt and nut attachment.
  9. Size for refrigerant capacity and tonnage at 2 psi pressure drop.
  10. Acceptable Manufacturers: Sporlan, Alco, Hubbell, Phillips, Henry.
- C. Moisture and Liquid Indicators:
1. Suitable for R-410A..
  2. Accurately calibrated to change color for indication of moisture.
  3. Large full view sight glass.
  4. Removable indicator element for sizes 1-3/8" and up. Remove before soldering.
  5. Full line size for liquid lines up to 2-1/8" O.D. 3/8" bypass indicator with preformed installation kit on larger sizes.
  6. Acceptable Manufacturers: Sporlan, Alco, Hubbell, Phillips, Henry.
- D. Sight Glasses:
1. Similar to Sporlan "See-all" moisture and liquid indicator with solder type connections.
  2. Install sight glass of the same size as the liquid line.
- E. Miscellaneous Valves and Accessories:
1. Drain valves for all pressure vessels.
  2. Dual pressure relief valves with manifold for all pressure vessels.
  3. Refrigerant service valves where indicated.
  4. Pressure - Temperature Test Ports and Test Kit:
    - a. Brass or stainless steel body with threaded cap and gasket.
    - b. Two self closing valves with intermediate pocket for added pressure protection.
    - c. Pressure temperature test kits consisting of 0- 150 psi pressure gauge with adapter, 25-125°F testing thermometer, 0-220°F testing thermometer, gauge adopted and protective carrying case (two required).
- F. Thermometers:
1. Red reading type, glass front, iron or phenol case, adjustable pattern, separable socket.

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2. Shall have 9 inch scale and 12 inch case.
3. Operating range shall occur in middle half of total range
4. Acceptable Manufacturers: Mueller, Taylor, Rochester.

G. Gauges:

1. Liquid pressure gauges constructed with bronze tube, stainless steel movement, white dial, black micrometer, adjustable pointer, iron case with black flange iron or phenol screwed ring, bottom connection.
2. Case diameter size shall be 4-1/2 inches minimum.
3. Operating range shall occur in middle half of total gauge range.
4. Provide needle valve for all gauges.
5. Acceptable Manufacturers: Crosby-Ashton Type AAO, Ashcroft, Lonegran

H. Refrigerant Charge: Complete operating charge of R-410A.

I. High pressure receiver, designed and constructed for 300 psi design working pressure with liquid seal float control, automatic liquid feed valve, drain and equalizer connections, liquid line filter-drier, moisture indicator, three service and bypass valves, charge valve and manual purge valve.

J. Locking Refrigerant Caps: Precision machined from high grade brass surrounded by a protective aluminum shroud. 3 year warranty. Provide one multi key per project to maintenance personnel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Furnish and install piping, fittings and appurtenances required to complete the piping systems shown on the drawings. Elbows shall be long radius type. Tees may not be field fabricated.
2. Run piping to true alignment, generally parallel or perpendicular to building walls, floors and ceilings, and with uniform grades and spacing, so as to present a neat and workmanlike appearance.
3. Care shall be paid to the exact locations of piping with respect to equipment, ducts, conduits, slabs, beams, lighting fixtures, columns, ceiling suspension systems, etc. to provide maximum access to mechanical and electrical equipment in the building. Close coordination and cooperation shall be exercised with other trades in locating the piping in the best interests of the Owner. The drawings and specifications covering other work to be done in the building shall be carefully studied and arrangements made to avoid conflict.
4. Not all necessary pipe offsets are indicated on the drawings because of the small scale. The various runs of piping to be installed shall be studied and adjustments made in exact routings as may be required for proper installation.
5. Conflicts arising during the erection of piping shall be brought to the attention of the Owner's Representative. No improvising or field changes will be permitted without the approval of the Owner's Representative.
6. Use full lengths of pipe wherever possible. Short lengths of pipe with couplings will not be permitted. Cut to exact measurement and install without forcing or spring unless otherwise shown on the drawings or specified.
7. Avoid tool marks and unnecessary pipe threads. Burrs formed when cutting pipe shall be removed by reaming. Before installing any pipe, care shall be taken that the inside is thoroughly cleaned and free of cuttings and foreign matter.

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- Measures shall be taken to preserve this cleanliness after erection.
8. Arrange pipe connections to valves and specialties so that there is clearance for easy removal of the valve or specialty from the line, and also for the removal of the valve bonnet and interior, and the specialty top and bottom and interior, except where otherwise approved by the Owner's Representative.
  9. Erect piping in such a manner so as to obtain sufficient flexibility and to prevent excessive stresses in materials and excessive bending movements at joints or connections to equipment. Make allowances throughout for expansion and contraction of piping. Provide each riser and horizontal run of piping with expansion loops, expansion joints, or expansion compensators where indicated and required. Securely anchor and adequately guide pipe as required or where indicated to force expansion to the expansion device without bending, binding, or misalignment of pipe. Branch connections from mains to risers shall be made with ample swing or offset to avoid undue strain on fittings or short pipe lengths. Where indicated, in lieu of expansion loops, expansion joints, or expansion compensators, horizontal runs of pipe shall be anchored at approximately midway of the run to force expansion, evenly divided, toward the mains and risers to provide for expansion and contraction of piping. Flexibility shall be provided by installing one or more turns in the line so that piping will spring enough to allow for expansion without straining.
  10. Installed piping shall not interfere with the operations or accessibility of doors or windows and shall not encroach on aisles, passageways and equipment, and shall not interfere with the servicing or maintenance of any equipment. Adjacent pipelines shall be grouped in the same horizontal or vertical plane.
  11. Where lines are purposely pitched for drainage, an accurate grade shall be maintained. No lines shall be supported in such a manner as to permit deflection, due to gravity, sufficient to pocket the lines when full of liquid. Grade mains as indicated by arrows on the drawings and in accordance with gradient as indicated in attached Piping Schedule.
  12. Piping found to have water hammer or other objectionable vibrations which cannot be eliminated by proper grading or other natural means, shall be braced, trapped or hung with shock absorbing hangers and equipped with air chambers, mechanical shock absorbers, flexible pipe connections or otherwise silenced using approved means.
  13. Use building steel wherever possible for supporting pipe hangers. Main structural steel shall not be drilled, cut or burned for hangers without the approval of the Owner's Representative. Expansion bolts shall be used only upon the approval of the Owner's Representative.
  14. Install unions or flanges in piping connections to equipment, regulating valves, and wherever necessary to facilitate the dismantling of piping and/or removal of valves and other items requiring maintenance.
  15. Avoid bushings. Reducing fittings shall be used wherever practical.
  16. The drawings indicate the size of piping and connections, and if certain sizes are omitted or unclear, obtain additional information before proceeding.
  17. The piping drawings have been worked out with a view to the most economical installation, taking into consideration accessibility and appearances, and the Contractor must follow the drawings accurately and if it is found impractical to install the work in accordance with the drawings and specifications, the Contractor shall notify the Owner's Representative before making any changes and get their approval or revised drawings before proceeding with the work. Verify all measurements on the job before cutting pipes or having piping fabricated, and be responsible for the correct location of all pipe connections, also check sizes and standard of outlets on the equipment, including the dimensions and drilling of flanges, etc.
  18. Copper tubing and galvanized steel shall not be mixed in any one run of piping.
  19. Change in direction shall be made with fittings, except that bending of steel and

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copper pipe 4 inches and smaller will be permitted, provided a pipe bender is used and wide sweep bends are formed. The center-line radius of bends shall be not less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations is not acceptable.

20. Threaded joints shall be made with tapered threads in accordance with ANSI B2.1, and made tight with an approved pipe thread joint compound or material, applied to the male threads only. Use compounds sparingly and apply with caution to ensure that compounds do not enter piping systems. When pipe joint is made up a maximum of 3 threads shall be visible.
21. Joints for plastic pipe shall be made in accordance with PPI Piping Manual.
22. Connections between ferrous and nonferrous metallic pipe shall be made with dielectric unions or flanges.
23. Connections between plastic and metallic pipe, between plastic and glass pipe, and between metallic and glass pipe, shall be made with transition fittings manufactured for the specific purpose.
24. Unions and flanges shall not be concealed in walls, partitions, or above inaccessible ceilings.

B. Valve and Specialties Applications

1. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
2. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
3. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
4. Install thermostatic expansion valves as close as possible to distributors on evaporators.
  - a. Install valve so diaphragm case is warmer than bulb.
  - b. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line. Verify proper location for the bulb with the valve manufacturer
  - c. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
5. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety relief-valve discharge line to outside according to ASHRAE 15.
6. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube on each circuit.
7. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
  - a. Solenoid valves.
  - b. Thermostatic expansion valves.
  - c. Hot-gas bypass valves.
  - d. Compressor.
8. Install filter dryers in liquid line between compressor and thermostatic expansion valve on each circuit.
9. Install receivers sized to accommodate pump-down charge.
10. Install flexible connectors at compressors.
11. Locking Refrigerant Caps: Provide at all exterior refrigerant service access ports (Schrader valves).
12. Install gauges with dial in vertical position. Locate between shut-off valve and

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equipment directly adjacent to equipment within normal visual range of operator standing on floor.

13. Provide nickel plated brass escutcheons or floor plates, around pipes piercing floors and walls in finished spaces. Fit around insulation or around pipe if uninsulated. Secure to pipe with setscrew. Provide deep escutcheon where sleeve projects beyond finished surface

C. Refrigerant Systems Additional Requirements:

1. Installation shall be in accordance with ANSI B31.5 Refrigeration Piping, unless specified otherwise herein.
2. Brazing procedures and operators shall be qualified in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.
3. Refrigerant pipeline accessories that may be damaged by heat shall be disassembled prior to joint brazing. Reassemble accessories after joint brazing operations are completed.
4. Joints shall be made with solder-type fittings. The outside surface of the tube where engaged in the fitting, and the inside surface of the fitting in contact with the tube, shall be cleaned with an abrasive material before brazing. Self-cleaning compounds are not allowed. Care shall be taken to prevent annealing of tube and fittings when making connections. Brazed joints shall be made with flux and the previously specified silver-brazing alloy. The brazing alloy shall be applied and drawn through the full fitting length. Excess brazing alloy shall be wiped from the joint before the brazing alloy hardens. Joints shall be made with heat applied uniformly around the entire circumference of the tube and fittings. Remove all excess flux for a clear visual inspection of all brazed connections.
5. Refrigerant piping installed below concrete slab- on-grade shall be installed in continuous runs without joints, and shall be encased in PVC plastic conduit. Ends of conduit shall be sealed watertight.

3.2 BRAZING AND SOLDERING

- A. Operator and Procedure Qualifications: All brazing operators and all brazing procedures shall be qualified in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.
- B. Brazing: Silver braze joints in accordance with MSS-SP-73 "Silver Brazing Joints for Wrought and Cast Solder Joint Fittings".
- C. Soldering:
  1. Joints in copper tubing shall be made with solder- type fittings. Outside surface of the tube where engaged in the fitting, and inside surface of the fitting in contact with the tube, shall be cleaned with an abrasive material before soldering. Self-cleaning compounds shall not be used. Care shall be taken to prevent annealing of tube and fittings when making connections. The solder joint shall be made with flux and wire form solder, except brazed joints. The flux shall be a mildly corrosive liquid or a petroleum based paste containing chlorides of zinc and ammonium. Solder shall be applied and drawn through the full fitting length. Excess solder shall be wiped from joint before solder hardens. Joints in copper tube sizes 2-1/2 inches and larger shall be made with heat applied uniformly around the entire circumference of the tube and fittings by a multi-flame torch. Use of oxy-acetylene cutting torch in lieu of multi-flame torch is not permitted. Disassemble valves and other accessories that may be damaged by heat before soldering.

3.3 TESTING OF PIPING SYSTEMS:

- A. Each piping system, after erection, shall be subjected to a pressure test. The test requirements shall be as follows:
  - 1. General: Furnish everything required for the tests. Notify Architect/Engineer at least 48 hours before any testing is performed. Independent Agent/Owner shall verify pressure test and sign off. Report to be furnished to Architect/Engineer. Testing shall be performed at the completion of each phase of the project.
  - 2. Refrigerant Piping Systems shall be tested with dry carbon dioxide, or nitrogen, at 315 psig for the high side, and at 245 psig for the low side. If leaks are to be detected by use of an electronic halogen detector, or a halide torch, the system shall be pressurized with refrigerant gas prior to introduction of dry carbon dioxide or nitrogen into the system. Pre-charging of system with refrigerant gas is not necessary for soap bubble leak detection method.
  - 3. Leaks, if any, shall be located, repaired, and retested in accordance with the test method specified for the system in which the leaks are located.
- B. Prior to testing a system, the Contractor shall provide the proper Building Official and the Owner's Representative with not less than 72 hours notice of the proposed test. The Contractor shall obtain approval of the test results. Where written approval is required, the Contractor shall obtain such written approval, and submit a copy of the approval.
- C. Work requiring testing shall not be covered, or otherwise concealed, until testing is completed and approval is granted.
- D. Work, or portions of work, that is altered in any way after testing and approval shall be retested, witnessed, and approval obtained.
- E. Systems requiring hydrostatic tests shall be protected from damage caused by freezing. After tests are completed drain all sections of pipe, including traps, or fill undrained sections and traps with antifreeze solution. Vent all high points to release vacuum and ensure complete drainage of closed systems, and blow out piping with compressed air to remove trapped water.
- F. Duration of tests, unless specified otherwise, shall be the time required to examine each joint in the system being tested.
- G. During tests, isolate system components that have test pressures less than pressures specified for system tests.
- H. Use clean soapy water applied to exterior of joints to locate leaks in systems using compressed air, dry carbon dioxide, or nitrogen, under positive pressure as a test medium.

END OF SECTION 23 23 00

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SECTION 23 81 25  
MINI SPLIT AIR CONDITIONING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 System Description

- A. The air conditioning system shall be a Mitsubishi Electric MSY-A split system series or approved equal. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven air conditioner design. The system shall have a SEER rating of 13.

1.3 Quality Assurance

- A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
- B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
- C. The units shall be rated in accordance with Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.
- D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
- E. A dry air holding charge shall be provided in the indoor section.
- F. System efficiency shall meet or exceed 13 SEER when part of a 1:1 (indoor/outdoor) system.
- G. Delivery, Storage and Handling
  - 1. Unit shall be stored and handled according to the manufacturer's recommendations.
  - 2. The wireless controller shall be shipped inside the carton with the indoor unit and able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.
- H. Warranty
  - 1. The units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of acceptance of building. The compressor shall have a warranty of 6 years from date of acceptance of building. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

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2. Manufacturer shall have over 10 years of continuous experience in the U.S. market.

PART 2 – PRODUCTS

2.1 INDOOR UNIT

- A. General: The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit shall be charged with dry air before shipment from factory.
- B. Unit Cabinet:
  1. The casing shall have a white finish.
  2. Multi directional drain and refrigerant piping, offering three (3) direction pipe alignment for all refrigerant piping and two (2) direction pipe alignment for condensate draining shall be standard.
  3. There shall be a separate back plate that secures the indoor unit firmly to the wall.
- C. Fan:
  1. The evaporator fan shall be an assembly with a line-flow fan direct driven by a single motor.
  2. The fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearing.
  3. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
  4. An integral, motorized air sweep flow louver shall provide for uniform air distribution.
  5. The indoor fan shall consist of three (3) speeds: High, Medium and Low.
- D. Filter
  1. Return air shall be filtered by means of easily removed, washable, Catechin Antioxidant Pre-filter and an anti-allergy enzyme filter – blue
- E. Coil
  1. The evaporator coil shall be of nonferrous construction with smooth plate fins on copper tubing.
  2. The tubing shall have inner grooves for high efficiency heat exchange
  3. All tube joints shall be brazed with phoscopper or silver alloy.
  4. The coils shall be pressure tested at the factory.
  5. A condensate pan and drain shall be provided under the coil.
- F. Electrical:
  1. The unit electrical power shall be as shown on the drawings.
  2. The system shall be equipped with A-Control – a system allowing the indoor unit to be powered directly from the outdoor unit using a 3-wire connection plus ground.
  3. The indoor unit shall not have any supplemental electrical heat elements.
  4. The outdoor unit shall be equipped with Pulse Amplitude Modulation (PAM) control for efficiency.



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G. Control:

1. The unit shall have a wireless controller to perform input functions necessary to operate the system.
2. The indoor unit shall have the option of a field installed hard-wired remote controller.
3. The controller shall consist of a Power On/Off switch, Mode Selector, Temperature Setting, Timer Control, Fan Speed Select and Auto Vane selector.
4. The indoor unit shall perform Self-diagnostic Function, Test Run switching and Check Mode switching.
5. Temperature changes shall be by 1°F increments with a range of 65-87°F.
6. The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or wired controller, providing emergency operation and controlling the outdoor unit.
7. The indoor units shall be capable of working with single-zone or multi-zone outdoor units
8. The system shall be capable of automatically restarting when the power is restored after power interruption.
9. Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off, System/Mode function.

2.2 OUTDOOR UNIT

A. General: The outdoor units are specifically designed to work with the MSY indoor units. The units must have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.

B. Unit Cabinet: The casing shall be fabricated of galvanized steel, bondenized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection

C. Coil:

1. The condenser coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
2. The coil shall be protected with an integral metal guard.
3. Refrigerant flow from the condenser shall be controlled by means of a metering orifice.

D. Compressor:

1. The compressor motor shall be direct current (DC).
2. The compressor shall be of a high performance hermetic, inverter driven, variable speed rotary type.
3. The outdoor unit shall have an accumulator.
4. The compressor will be equipped with an internal thermal overload.
5. The outdoor unit must have the ability to operate with a maximum height difference of 35 feet and have refrigerant tubing length of 65 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.
6. The compressor shall be mounted to avoid the transmission of vibration.

E. Electrical:

1. The unit electrical power shall be as shown on the drawings.

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2. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.
3. The outdoor unit shall be controlled by the microprocessor located in the indoor unit and outdoor unit.

PART 3 – EXECUTION

3.1 GENERAL

- A. Each system shall perform in accordance to the ratings shown on the drawing schedule.

END OF SECTION 23 81 25

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SECTION 26 01 00 - OPERATION AND MAINTENANCE MANUALS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. O & M Manuals contain copies of all warranties, operation and maintenance instructions, and other pertinent information relative to the project that is used throughout the life of the facility. This section contains additional requirements for the preparation of Electrical (Power and Lighting) and Systems Operation and Maintenance Manuals.

1.3 OPERATION AND MAINTENANCE MANUALS

- A. O& M Manuals shall consist of a minimum of one hard cover view type 3-ring binder sized to hold 8 1/2 inch x 11 inch sheets for Electrical and Systems. Refer to Division 01, General Requirements for additional requirements.
  - 1. Each binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1 inch, maximum spline size to be 3 inch. Provide additional binders if 3 inch size is not sufficient to properly hold submittals.
  - 2. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for O & M Manuals at the end of this section. Description sheet is to be white with black letters, minimum of 11 inches high and full width of pocket. Description is to describe project and match project drawing/project manual description. Description to include submittal type, i.e. Operation and Maintenance for Electrical (Power and Lighting).
- B. O & M Data:
  - 1. Manufacturers' operation and maintenance data is required for all items as called for in the specifications. O & M Manuals shall include manufacturer's name, model number(s), characteristics, manufacturer's agent, service agent, supplier, where and/or what item(s) are used for and description (i.e. surge suppression - switchboard MDPA).
  - 2. Include troubleshooting instructions, list of special tools required, theory of operation, manufacturer's care and cleaning, preventative maintenance instructions, wiring diagrams, and point-to-point schematics.
- C. O & M Manuals to include but are not limited to:
  - 1. Completed forms and information per Division 01, General Requirements, and this section of the specifications. Reinforced separation sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule.
    - a) Table of Contents
    - b) Project Information Sheet
    - c) Reinforced Separation Sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule
    - d) Check Out Memo
    - e) Conductor Insulation Resistance Test
    - f) DC High Voltage Cable Test Report
    - g) Ground Test Information
    - h) Motor Test Information
    - i) Voltage and Amperage Readings (Tabulated Data)

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- j) Progress and Record Drawing Certification
  - k) Spare Parts Certification Memo
2. Shop Drawings: Shop drawings shall be a copy of the final and accepted shop drawing submitted as required in Section Submittals. These shall be inserted in binder in proper order.
  3. Product Data: Product data and/or Catalog sheets shall be a copy of the final and accepted submittal submitted as required in Section Submittals. These shall be inserted in binder in proper order.
  4. Warranties/Guarantees: Provide copy of warranties/guarantees. Original warranties/guarantees are to be incorporated into separate project warranty book with warranties/guarantees provided for other sections and divisions of the specifications and submitted for Architectural/Owner acceptance.
  5. Copies of electrical panel schedules and electrical panel directories included with the corresponding specification section.
  6. For Sections 26
    - a) Product data and/or catalog sheets on all equipment applicable to this project.
    - b) Equipment supplier list for each section's equipment.
    - c) Ground fault wiring devices; in addition to above provide:
      1. Wiring diagram.
    - d) Grounding; in addition to above provide:
      1. Test results on each ground rod.
      2. Ground Test Information Form
  7. Sections 26
    - a) Product data and/or catalog sheets on equipment applicable to this project.
    - b) Equipment supplier list for each sections equipment.
    - c) Panels, distribution panelboards, switchboards; in addition to above provide:
      1. Copy of directory.
      2. Check-Out Memo Form
    - d) Overcurrent protective devices; in addition to above provide the following for large circuit breakers:
      1. Parts list.
      2. Operation and maintenance requirements.
      3. Wiring diagrams.
      4. Testing data.
      5. Installation/removal instructions.
      6. Check-Out Memo Form
  8. Sections 26
    - a) Product data and/or catalog sheets on all equipment applicable to this project.
    - b) Equipment supplier list for each sections equipment.
    - c) Lighting fixtures; in addition to above provide the following:
      1. Operation and maintenance requirements/instructions for special light fixtures (these fixtures to be determined by A/E) including:
        - (a) installation/removal instructions.
        - (b) special re-lamping instructions.
      2. Parts list.

1.4 SUBMITTALS

- A. Submit a minimum of three (3) sets of O & M Manuals, two (2) sets for Owner, one (1) set for Engineer.
- B. The Contractor shall review the manuals before submitting to the A/E. No request for

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payment will be considered until the brochure has been reviewed and submitted for acceptance.

- C. Provide additional copies if additional copies are required in other Divisions and/or sections of these specifications.

1.5 DELAYS

- A. Contractor is responsible for delays in job project accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.6 RESUBMITTALS

- A. The A/E shall be reimbursed cost to review re-submittals subsequent to the second submittal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

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**PROJECT INFORMATION SHEET**

Project Name: \_\_\_\_\_

Project Number: \_\_\_\_\_

Substantial Completion Date: \_\_\_\_\_

Certificate of final Completion Date: \_\_\_\_\_

	Name & Address	Phone/Fax	Contact
Authorized Construction Representative			
Architect			
Mechanical Engineer			
Electrical Engineer	Matern Professional Engineering, Inc. 130 Candace Drive Maitland, Florida 32751	P: 407/740-5020 F: 407/740-0365	
Civil Engineer			
Structural Engineer			
Food Service Consultant			
Other Consultant(s)			

Brief Description of Project Scope:

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**CHECK OUT MEMO**

Check Out Memo shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name \_\_\_\_\_

Type of Equipment Checked \_\_\_\_\_

Equipment Number \_\_\_\_\_

Manufacturer of Equipment \_\_\_\_\_

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

- The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
- The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.\*
- Written operating and maintenance information has been presented and reviewed in detail with the Contractor.
- Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE – PRINT NAME

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
TELEPHONE, FAX, E-MAIL

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE – SIGNATURE AND TITLE

\_\_\_\_\_  
DATE CHECKED

WITNESSED BY:

\_\_\_\_\_  
CONTRACTOR'S REPRESENTATIVE – SIGNATURE AND TITLE

**\*EXCEPTIONS NOTED AT TIME OF CHECK-OUT (USE ADDITIONAL PAGE IF NECESSARY)**

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**CONDUCTOR INSULATION RESISTANCE TEST**

PROJECT NAME \_\_\_\_\_

CONDUCTOR FROM \_\_\_\_\_ TO

SIZE \_\_\_\_\_

INSULATION TYPE \_\_\_\_\_

INSULATION VOLTAGE RATING \_\_\_\_\_

DATE \_\_\_\_\_ TIME \_\_\_\_\_

WEATHER CONDITIONS \_\_\_\_\_

TEST VOLTAGE (DC) \_\_\_\_\_

RANGE \_\_\_\_\_

MEGGER INSTRUMENT/SERIAL NUMBER \_\_\_\_\_

TESTING METHODOLOGY \_\_\_\_\_

INSULATION RESISTANCE MEASUREMENT (ACCEPTABLE MEASUREMENT NOT TO BE LESS THAN (1) MEGOHM):

PHASE A TO GROUND \_\_\_\_\_

PHASE B TO GROUND \_\_\_\_\_

PHASE C TO GROUND \_\_\_\_\_

NEUTRAL TO GROUND \_\_\_\_\_

ISOLATED GROUND TO GROUND \_\_\_\_\_

CONTRACTOR'S REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

OWNER'S REPRESENTATIVE \_\_\_\_\_

DATE: \_\_\_\_\_

ENGINEER'S REPRESENTATIVE: \_\_\_\_\_

DATE: \_\_\_\_\_



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**DC HIGH VOLTAGE CABLE TEST**

Project Name \_\_\_\_\_

Location \_\_\_\_\_

Description \_\_\_\_\_

Rated Voltage \_\_\_\_\_

TEST DATA

Set Leakage @ Test Voltage \_\_\_\_\_ ma      Variac \_\_\_\_\_

Pri. Voltage \_\_\_\_\_

Sphere Gap \_\_\_\_\_ Inches

Duct Temp. \_\_\_\_\_ Ambient Temp. \_\_\_\_\_ Weather \_\_\_\_\_

Cable Status \_\_\_\_\_ 1 hour prior to test

\_\_\_\_\_

Phase or Conductor	<u>A</u>	<u>B</u>	<u>C</u>	Remarks
Starting Time	MA	MA	MA	

- 0
- 15 sec.
- 30 sec.
- 45 sec.
- 1 min.
- 2 min.
- 3 min.
- 4 min.
- 5 min.

Final Test Voltage \_\_\_\_\_

Time Finish: \_\_\_\_\_

KV DC after 1 min.

Test Procedure \_\_\_\_\_ Number of Terminals \_\_\_\_\_

Joints \_\_\_\_\_

Witnessed By: \_\_\_\_\_ Performed By: \_\_\_\_\_

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**GROUND TEST INFORMATION**

PROJECT NAME: \_\_\_\_\_

GROUND TYPE: \_\_\_\_\_

TEST BY: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_

GROUND LOCATION: \_\_\_\_\_

GROUND TYPE (Rod, Water pipe, etc.):

PRIOR TO CONNECTION TO SYSTEM

GROUND \_\_\_\_\_ (OHMS)

AFTER CONNECTION TO SYSTEM

GROUND \_\_\_\_\_ (OHMS)

WEATHER CONDITIONS (Wet/Dry) \_\_\_\_\_

SOIL CONDITIONS (Wet/Dry) \_\_\_\_\_

CONTRACTOR'S REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

ENGINEER'S REPRESENTATIVE \_\_\_\_\_

DATE: \_\_\_\_\_

OWNER'S REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

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**MOTOR TEST INFORMATION**

PROJECT NAME: \_\_\_\_\_  
DESCRIPTION OF MOTOR: \_\_\_\_\_  
NAME OF CHECKER: \_\_\_\_\_  
DATE CHECKED: \_\_\_\_\_

Name and Identifying Mark of Motor (indicate at existing) \_\_\_\_\_

Manufacturer \_\_\_\_\_

Model Number \_\_\_\_\_

Serial Number \_\_\_\_\_

RPM \_\_\_\_\_

Frame Size \_\_\_\_\_

Code Letter \_\_\_\_\_

Horsepower \_\_\_\_\_

Nameplate Voltage and Phase \_\_\_\_\_

Nameplate Amps \_\_\_\_\_

Actual Voltage \_\_\_\_\_

Actual Amps \_\_\_\_\_

Starter Manufacturer \_\_\_\_\_

Starter Size \_\_\_\_\_

Heater Size, Catalog No. and Amp Rating \_\_\_\_\_

Manufacturer of Dual-Element Fuse \_\_\_\_\_

Amp Rating of Fuse \_\_\_\_\_

Power Factor \_\_\_\_\_

CONTRACTOR'S REPRESENTATIVE: \_\_\_\_\_

DATE: \_\_\_\_\_

SIGNATURE OF CHECKER: \_\_\_\_\_

DATE: \_\_\_\_\_

OWNER'S AUTHORIZED REPRESENTATIVE: \_\_\_\_\_

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**VOLTAGE AND AMPERAGE READINGS (TABULATED DATA)**

PROJECT NAME \_\_\_\_\_

SWITCHGEAR/PANELBOARD \_\_\_\_\_

FULL LOAD AMPERAGE READINGS:

DATE \_\_\_\_\_

TIME \_\_\_\_\_

PHASE      A \_\_\_\_\_  
              B \_\_\_\_\_  
              C \_\_\_\_\_  
              N \_\_\_\_\_  
              GROUND \_\_\_\_\_

FULL LOAD VOLTAGE READINGS:

DATE \_\_\_\_\_

TIME \_\_\_\_\_

PHASE      A TO N \_\_\_\_\_ A TO B

              B TO N \_\_\_\_\_ A TO C

              C TO N \_\_\_\_\_ B TO C

VOLTAGE AT THE END OF THE LONGEST BRANCH \_\_\_\_\_

TYPE OF LOAD \_\_\_\_\_

NO LOAD VOLTAGE READINGS:

DATE \_\_\_\_\_

TIME \_\_\_\_\_

PHASE      A TO N \_\_\_\_\_ A TO B

              B TO N \_\_\_\_\_ A TO C

              C TO N \_\_\_\_\_ B TO C

ENGINEER'S REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

OWNER'S AUTHORIZED REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

CONTRACTOR'S REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

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**PROGRESS AND RECORD DRAWING CERTIFICATION**

NAME OF PROJECT: \_\_\_\_\_

DIVISION NUMBER AND NAME: \_\_\_\_\_

This is to certify that the attached marked-up design prints were marked as the items were installed at the site during construction, and that these prints represent as accurate "As-Builts" record of the work as actually installed. One copy will be turned over to the Owner at the instruction in Operation Conference. The duplicate copy is for the Engineer's files.

\_\_\_\_\_  
General Contractor

: \_\_\_\_\_  
By: Authorized Signature And Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Subcontractor

\_\_\_\_\_  
By: Authorized Signature And Title

\_\_\_\_\_  
Date

**SPARE PARTS / MAINTENANCE STOCK CERTIFICATION**

This form verifies that the parts/stock listed below has been delivered to and received by Maintenance Department. Original shall be included in the Closeout Documentation Manual. Copies shall also be included in the O & M Manual.

Project Name: \_\_\_\_\_

Type/Name of Spare Parts/Attic Stock: \_\_\_\_\_

\_\_\_\_\_

Specification Reference: \_\_\_\_\_

Quantity of Spare Parts/Attic Stock: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Signature below by the Contractor and Subcontractor signifies that the spare parts/maintenance stock, required by the Contract Documents, have been delivered to the Owner.

\_\_\_\_\_  
Contractor/CM

\_\_\_\_\_  
Authorized Signature, Title

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

\_\_\_\_\_  
Subcontractor

\_\_\_\_\_  
Authorized Signature, Title

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

Signature by the Owner acknowledges receipt of the same spare parts/maintenance stock.

\_\_\_\_\_  
Department

\_\_\_\_\_  
Authorized Signature, Title

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

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BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spine) 3-Ring Binder

MANUAL COVER (face)

ORANGE COUNTY CORRECTIONS SHERIFF SECTOR IV ELEVATOR MODERNIZATION MPE NO. 2014-197  ELECTRICAL OPERATION AND MAINTENANCE MANUAL  DATE
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MANUAL COVER (Spine)

ORANGE COUNTY CORRECTIONS SHERIFF SECTOR IV ELEVATOR MODERNIZATION  MPE NO. 2014-197  E L E C T R I C A L  OPERATION AND MAINTENANCE MANUAL  DATE
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SECTION 26 01 03 - MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install all equipment, labor, material, accessories, and mounting hardware for minor electrical demolition for remodeling.

1.3 REFERENCES

- A. NFPA 70 National Electrical Code
- B. Underwriters Laboratories

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work as specified in individual sections.
- B. Provide all materials necessary for work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only Panels for this equipment replacement to make switchovers and connections. Obtain permission from Orange County Project Manager, building manager, and approval from Engineer at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Orange County Project Manager, Engineer and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. For the full period of time the system is deactivated, a safety fireman's watch is required to be provided to enact a fire watch for areas that experience a loss of fire protection and notification coverage due to the modifications.



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3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- F. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- G. Repair adjacent construction and finishes damaged during demolition and extension work.
- H. Seal openings in walls, floors, etc. and fire stop in accordance with the accepted UL detail to maintain integrity of assembly.
- I. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate and as required to comply with the requirements of the NEC.
- J. Extend existing installations using materials and methods compatible with existing electrical installations. Extension must meet or exceed the materials/methods specified in the contract documents.

3.4 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused, including but not limited to:
  - 1. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

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SECTION 26 01 05 - INVESTIGATION OF EXISTING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes testing and documentation of existing electrical systems.
- B. Test the essential features of the following existing electrical systems:
  - 1. Fire detection devices, smoke detection devices.
    - a) Note that existing fire alarm system is less than one year old. Verify proper performance in relation to elevator operation.
  - 2. Emergency lighting fixtures.
  - 3. Outlets: Convenience.
  - 4. Building grounding systems.
- C. Each system shall be tested once only, and after completion of testing, results given to the Owner, Engineer and/or Owner's Representative. Point out any non-operational function noticed during testing.
- D. Document the existing conditions and operation of the existing electrical systems prior to any work.
- E. Contractor is responsible for all non-working systems and their components unless non-working status is verified prior to work on system.

1.3 REFERENCES

- A. IEEE Recommended Practices

1.4 DESCRIPTION

1.5 TIME

- A. The testing shall be held at a date to be agreed upon in writing by the Owner or his representative.

1.6 ATTENDING PARTIES

- A. The testing shall be held in the presence of the Owner, or his Representative and Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PERFORMANCE VERIFICATION

- A. Test the operation of each of the following existing devices and associated systems:
  - 1. Fire Alarm System:
    - a) Test each heat detector. Record location of each tested device; note either operational or non-operational.
    - b) Test each smoke detector with canned smoke. Record location of each tested device; note either operational or non-operational.
    - c) Upon alarm activation verify that the fire alarm zone lights and audible/visual signals function properly. Verify that the local fire department or responding agency receives an automatic signal.

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2. Lighting and Exit Lighting Fixtures In Areas of Remodel and/or Renovation:
    - a) Test all lighting fixtures and exit lights for proper operation, list bad ballasts, lamps or broken lenses. Record location of fixtures tested.
    - b) Test light switches, relay controls, and photo cell controls for proper operation. Record location of tested device; note operational or non-operational.
  3. Wiring Devices (Outlets) In Areas of Remodel and/or Renovation:
    - a) Test receptacles for continuity, open grounds, open neutrals etc. Use circuit testers and record location and results of tested device.
  4. Ground System:
    - a) Verify Proper resistance to ground is less than 250ohms at elevator Controller. Where grounding resistance is greater than the value required by this Specification, Contractor is to bring this to the attention of both the Engineer and Owner in writing along with the Ground Test Information Form.
- B. The Electrical Contractor shall investigate all existing systems as called out in this performance verification prior to the beginning of any work which could affect these systems.
- C. Each system shall be retested after completion of remodel and/or renovation to ensure proper operation is maintained. Demonstrate operation per Section 26 08 03 Demonstration of Completed Electrical Systems.

3.2 INVESTIGATION/TESTING FORMS

- A. Submit Existing Facilities Investigation Form (included at the end of this Section) and advise Owner/Engineer of all deficiencies in system(s) prior to work. All systems will be assumed to be fully operational if Form is not received by Engineer prior to work on system.
- B. Submit five copies of Existing Facilities Investigation Form for each device tested, signed by the Contractor, Subcontractor and Owner and submit each test result to the Owner's Authorized Representative.

Attachments:  
Existing Facilities Investigation  
Ground Test Information

END OF SECTION

**EXISTING FACILITIES INVESTIGATION**

PROJECT: \_\_\_\_\_

The existing systems on the above project have been investigated and checked to determine the existing condition of all existing electrical systems within the area(s) affected by the scope of work of this project. The investigation consisted of testing all electrical systems/devices as required by Section 26 01 05 Investigation of Existing Electrical Systems.

All equipment was found to be operational except as noted herein (list below):

\_\_\_\_\_  
PRIME CONTRACTOR

\_\_\_\_\_  
AUTHORIZED SIGNATURE AND TITLE

DATE \_\_\_\_\_

\_\_\_\_\_  
OWNER'S AUTHORIZED REPRESENTATIVE

\_\_\_\_\_  
AUTHORIZED SIGNATURE AND TITLE

DATE \_\_\_\_\_

Note To Contractor: Upon completion of investigation and one week prior to the commencement of work, submit five copies of the completed Existing Facilities Investigation Form to the Owner's Authorized Representative, signed and dated by the Contractor. The Owner's Authorized Representative's signature and date is required to verify receipt of Form. Retain copy(ies) and submit copy of Form in each Operation and Maintenance Manual. Contractor shall submit quantities of Forms as required to present required information.

**GROUND TEST INFORMATION**

PROJECT NAME: \_\_\_\_\_

GROUND TYPE: \_\_\_\_\_

TEST BY: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_

GROUND LOCATION: \_\_\_\_\_

GROUND TYPE (Rod, Water pipe, etc.):

PRIOR TO CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

AFTER CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

WEATHER CONDITIONS (Wet/Dry):

SOIL CONDITIONS (Wet/Dry):

\_\_\_\_\_  
CONTRACTOR'S REPRESENTATIVE

DATE \_\_\_\_\_

\_\_\_\_\_  
ENGINEER'S REPRESENTATIVE

DATE \_\_\_\_\_

\_\_\_\_\_  
OWNER'S REPRESENTATIVE

DATE \_\_\_\_\_

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SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes Basic Electrical Requirements specifically applicable to Division 26 Sections.

1.3 DESCRIPTION OF WORK

- A. The work required under this Division shall include all materials, labor and auxiliaries required to install a complete and properly operating electrical system.
- B. The Contractor shall furnish, perform, or provide all labor including planning, purchasing, transporting, storing, installing, testing, cutting and patching, trenching, excavating, backfilling, coordination, field verification, equipment (installation and safety), supplies, and materials necessary for the correct installation of complete electrical systems (as described or implied by these specifications and the applicable drawings) in strict accordance with applicable codes, which may not be repeated in these specifications, but are expected to be common knowledge of qualified Bidders.
- C. The Division 26 Sections refer to work required in addition to (or above) the minimum requirements of the NEC and applicable local codes. All work shall comply with all applicable codes as a minimum and with the additional requirements called for in these Contract Documents.
- D. Only trained and qualified personnel shall be used by the Contractor to perform work. The Contractor shall not perform work which violates applicable Codes, even if called for in the Contract Documents. The Contractor's Bid shall include work necessary to completely install the electrical systems indicated by the Contract Documents in accordance with applicable Codes.
- E. Refer to other Division 26 Sections for additional work requirements.
- F. Connections of all items using electric power shall be included under this division of the specifications, including necessary wire, conduit, circuit protection, disconnects and accessories. Securing of roughing-in drawings and connection information for equipment involved shall also be included under this division. See other divisions for specifications for electrically operated equipment.

1.4 WORK SEQUENCE

- A. Install work in stages and/or phases to accommodate Owner's occupancy requirements. Coordinate electrical schedule and operations with Owner and Architect/Engineer.

1.5 CODES, FEES, AND STANDARDS

- A. Conform to all applicable requirements of Section Reference Standards and Regulatory Requirements.
- B. Obtain permits and request inspections from authority having jurisdiction and applicable utility companies.
- C. Pay for all required licenses, fees, and inspections.
- D. Material shall be new and free of defects with UL listing or be listed with an approved, nationally recognized Electrical Testing Agency if and only if UL listing is not available for material.

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1.6 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown or described in the Contract Documents, unless prevented by Project conditions.
- B. The Contractor shall install all equipment so that all Code required and manufacturer recommended servicing clearances are maintained. Contractor shall be responsible for the proper arrangement and installation of all equipment within any designated space. Should the Contractor determine that a departure from the Contract Documents is necessary, he shall submit to the A/E, for approval, detailed drawings of his proposed changes with his written reasons for the changes. No changes shall be implemented by the Contractor without the issuance of the required drawings, clarifications, and/or change orders.
- C. The Contractor shall verify finish dimensions at the project site in preference to using dimensions noted on Contract Documents.

1.7 INVESTIGATION OF SITE

- A. Check site and existing conditions thoroughly before bidding. Advise A/E of discrepancies or questions noted.
- B. Each Bidder shall visit the site and shall thoroughly familiarize himself with existing field conditions and the proposed work as described or implied by the Contract Documents. During the course of the site visit, the electrical bidder shall verify every aspect of the proposed work and the existing field conditions in the areas of construction and demolition which will affect his work. The Contractor will receive no compensation or reimbursement for additional expenses he incurs due to failure to make a thorough investigation of the existing facilities. This shall include rerouting around existing obstructions.
- C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.
- D. Existing conditions and utilities indicated are taken from existing construction documents, surveys, and field investigations. Unforeseen conditions probably exist and existing conditions shown on drawings may differ from the actual existing installation with the result being that new work may not be field located exactly as shown on the drawings. Contractor shall field verify dimensions of all site utilities, conduit routing, boxes, etc., prior to bidding and include any deviations in the contract. Notify A/E if deviations are found.
- E. All existing electrical is not shown. The Contractor shall become familiar with all existing conditions prior to bidding, and include in his bid the removal of all electrical equipment, wire, conduit, devices, fixtures, etc. that is not being reused, back to its originating point.
- F. The Contractor shall locate all existing utilities and protect them from damage. The Contractor shall pay for repair or replacement of utilities or other property damaged by operations in conjunction with the completion of this work.
- G. Remove existing power, lighting, systems, material and equipment which are made obsolete or which interfere with the construction of the project. Reinstall power, lighting, systems, materials and equipment which are required to remain active for the facility to be fully functional.
- H. All items removed and not re-used shall be immediately turned over to Owner as they are made available by renovation. Remove items from job site and deliver to Owner's storage location(s) as directed by project manager. Discard complete items which Owner elects to refuse.
- I. Investigate site thoroughly and reroute all conduit and wiring in area of construction in order to maintain continuity of existing circuitry. Existing conduits indicated in Contract Documents indicate approximate locations only. Contractor shall verify and coordinate existing site conduits and pipes prior to any excavation on site. Bids shall include hand digging and all required

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rerouting in areas of existing conduits or pipes.

- J. Work is in connection with existing buildings which must remain in operation while work is being performed. Work shall be in accord with the schedule required by the Contract. Schedule work for a minimum outage to Owner. Notify Owner 72 hours in advance of any shut-down of existing systems. Perform work during non-general office operating hours unless otherwise accepted by Owner. Protect existing buildings and equipment during construction.
- K. Bid shall include all removal and relocation of all piping, fixtures or other items required for completion of alterations and new construction.
- L. See Section Minor Electrical Demolition for Remodeling for additional requirements due to existing conditions.

1.8 CONTRACT DOCUMENTS

- A. These specifications and applicable drawings shall be considered supplementary, one to the other and are considered Contract Documents. All workmanship, methods, and/or material described or implied by one and not described or implied by the other shall be furnished, performed, or otherwise provided just as if it had appeared in both sets of documents.
- B. Where a discrepancy or conflict is found between these specifications and any applicable drawing, the Contractor shall notify the A/E in written form. In the event that a discrepancy exists between specifications and any applicable drawing, the most stringent requirement shall govern unless the discrepancy conflicts with applicable codes wherein the code shall govern. The most stringent requirement shall be that work, product, etc which is the most expensive and costly to implement.
- C. The drawings are diagrammatic and are not intended to include every detail of construction, materials, methods, and equipment. They indicate the result to be achieved by an assemblage of various systems. Coordinate equipment locations with Architectural and Structural drawings. Layout equipment before installation so that all trades may install equipment in spaces available. Coordinate installation in a neat and workmanlike manner.
- D. Wiring arrangements for equipment shown on the drawings are intended to be diagrammatic and do not show all required conductors and functional connections. All wiring and appurtenances required for the proper operation of all equipment to be connected shall be provided.
- E. Specifications require the Contractor to provide shop drawings which shall indicate the fabrication, assembly, installation, and erection of a particular system's components. Drawings that are part of the Contract Documents shall not be considered a substitute for required shop drawings, field installation drawings, Code requirements, or applicable standards.
- F. Locations indicated for outlets, switches, and equipment are approximate and shall be verified by instructions in specifications and notes on the drawings. Where instructions or notes are insufficient to locate the item, notify the A/E.
- G. The Contractor shall take finish dimensions at the project site in preference to scaling dimensions on the drawings.
- H. Where the requirements of another division, section, or part of these specifications exceed the requirements of this division those requirements shall govern.

1.9 MATERIALS AND EQUIPMENT

- A. Material shall be new (except where specifically noted, shown or specified as "Reused") and/or denoted as existing) and shall be UL listed and bear UL label. Where no UL label listing is available for a particular product, material shall be listed with an approved, nationally recognized Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or



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exceeds available standards.

- B. Where Contract Documents list design selection or manufacturer, type, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to A/E's review and acceptance. Where Contract Documents list accepted substitutions, these items shall comply with Section Substitutions and requirements.
- C. When a product is specified to be in accordance with a trade association or government standard and at the request of A/E the Contractor shall furnish a certificate that the product complies with the referenced standard and supporting test data to substantiate compliance.
- D. Where multiple items of the same equipment or materials are required, they shall be the product of a single Manufacturer.
- E. Where the Contract Documents require materials and/or equipment installed, pulled, or otherwise worked on, the materials and/or equipment shall be furnished and installed by the Contractor responsible for Division 26 methods and materials unless specifically noted otherwise.
- F. Where the contract documents refer to the terms "furnish," "install," or "provide," or any combination of these terms) the materials and/or equipment shall be supplied and delivered to the project including all labor, unloading, unpacking, assembly, erection, anchoring, protecting supplies and materials necessary for the correct installation of complete system unless specifically noted otherwise.
- G. Before the Contractor orders equipment, the physical size of specified equipment shall be checked to fit spaces allotted on the drawings, with NEC working clearances provided. Internal access for proposed equipment substitutions shall be provided.
- H. Electrical equipment shall be protected from the weather during shipment, storage, and construction per manufacturer's recommendations for storage and protection. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner. No additional time will be allowed and the project completion date shall be maintained.
- I. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair and test damaged equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for the test shall be provided by the Contractor with no additional cost to the Contract.
- J. Material and equipment shall be provided complete and shall function up to the specified capacity/function. Should any material and/or equipment as a part or as a whole fail to meet performance requirements, replacements shall be made to bring performance up to specified requirements. Damages to finish by such replacements, alterations, or repairs shall be restored to prior conditions, at no additional cost to the Owner.
- K. Where tamperproof screws are specified or required, Phillips head or Allen head devices shall not be accepted. For each type used, provide Owner with three tools. Owner will designate the specific hardware design to correspond with existing devices elsewhere in the building, to limit special tool requirements.
- L. Where the Contract Documents denote equipment and/or material to be 'new' and/or 'existing' and also provide no denotation for other equipment as to it being 'new' and/or 'existing,' this is not to infer that the non-denoted equipment is either new or existing, or opposite of the equipment that is denoted. The use of the terms 'new' or 'existing' is meant to clarify denoted equipment/materials for that item only, and the lack of the terms 'new' or 'existing' in relation to identifiers/notes/denotations on the drawings is not to infer that this non-denoted equipment or materials is new or existing.

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1.10 MISCELLANEOUS CIRCUITS REQUIRED

- A. Provide 120 volt, 20 amp circuit to all fire alarm panels, remote panels, etc (whether shown on drawings or not). Connect to spare 20 amp, 1 pole circuit breaker in nearest 120 volt panel. Re-label circuit breaker accordingly. Provide locking device on breaker. Coordinate location with fire alarm system engineer (and drawings/specifications) prior to bid and provide all electrical. Coordinate final location and electrical requirements with panel installer after bid and provide all electrical. Nearest panel to be nearest emergency panel, when building has emergency generator system.
- B. Provide 120 volt, 20 amp circuit to fire and smoke dampers (whether shown on drawings or not). Connect to spare 20 amp, 1 pole circuit breaker in nearest 120 volt panel. Re-label circuit breaker accordingly. Provide locking device on breaker. Coordinate location with fire protection engineer (and drawings/specifications) prior to bid and provide all electrical. Coordinate final location and electrical requirements with damper installer after bid and provide all electrical. Nearest panel to be nearest emergency panel, when building has emergency generator system.

1.11 SUPERVISION OF THE WORK

- A. Reference the General Conditions for additional requirements.
- B. The Contractor shall provide experienced, qualified, and responsible supervision for work. A competent foreman shall be in charge of the work in progress at all times. If, in the judgement of the A/E, the foreman is not performing his duties satisfactorily, the Contractor shall immediately replace him upon receipt of a letter of request from the A/E. Once a satisfactory foreman has been assigned to the work, he shall not be withdrawn by the Contractor without the written consent of the A/E.
- C. Provide field superintendent who has had a minimum of four (4) years previous successful experience on projects of comparable size and complexity. Superintendent shall be on the site at all times during construction and must have, as a minimum, an active Journeyman's Electrical License in the State of Florida.
- D. Superintendent shall be employed by a currently licensed Florida Certified Electrical Contractor (EC) or currently licensed Florida Registered Electrical Contractor (ER).

1.12 COORDINATION

- A. Provide all required coordination and supervision where work connects to or is affected by work of other trades, and comply with all requirements affecting this Division. Work required under other divisions, specifications or drawings to be performed by this Division shall be coordinated with the Contractor and such work performed at no additional cost to Owner including but not limited to electrical work required for:
  - 1. Elevators
  - 2. Mechanical Division of the Specifications
- B. Contractor shall obtain set of Contract Documents from Owner for all areas of work noted above and include all electrical work in bid whether included in Division 26 Sections or not.
- C. Installation studies shall be made to coordinate the electrical work with other trades. Work shall be preplanned. Unresolved conflicts shall be referred to the A/E prior to installation of the equipment for final resolution.
- D. For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings at 1/4" scale showing the actual physical dimension required for the installation to assure proper integration of equipment with building systems and NEC required clearances. Coordination drawings shall be provided for all areas of conflict as determined by the A/E.

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- E. Secure accepted shop drawings from all required disciplines and verify final electrical characteristics before roughing power feeds to any equipment. When electrical data on accepted shop drawings differs from that shown or called for in Construction Documents, make adjustments to the wiring, disconnects, and branch circuit protection to match that required for the equipment installed.
- F. Damage from interference caused by inadequate coordination shall be corrected at no additional cost to the Owner and the contract time for completion will not be extended.
- G. The Contractor shall maintain an up-to-date set of Contract Documents (Drawings and Specifications) of all trades on the project site, including Mechanical and Electrical.
- H. The Contract Documents describe specific sizes of switches, breakers, fuses, conduits, conductors, motor starters and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). The Contractor shall coordinate the requirements of each load with each load's respective circuitry shown and with each load's requirements as noted on its nameplate data and manufacturer's published electrical criteria. The Contractor shall adjust circuit breaker, fuse, conduit, and conductor sizes to meet the actual requirements of the equipment being provided and installed and change from single point to multiple points of connection (or vice versa) to meet equipment requirements. Changes due to these coordination efforts shall be made at no additional cost to the Owner.

1.13 PROVISION FOR OPENINGS

- A. Locate openings required for work. Provide sleeves, guards or other accepted methods to allow passage of items installed.
- B. Coordinate with roofing Contractor on installation of electrical items which pierce roof. Roof penetrations shall not void roof warranty.
- C. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with Contractor prior to installation.

1.14 SURFACE MOUNTED EQUIPMENT

- A. Surface mounted fixtures, outlets, cabinets, conduit, panels, etc. shall have factory applied finish and/or shall be painted as directed by Engineer. Paint shall be in accordance with other applicable sections of the specifications for this project.

1.15 CUTTING AND PATCHING

- A. Existing Construction:
  - 1. See Section Minor Electrical Demolition for Remodeling for additional requirements.

1.16 INSTALLATION

- A. Erect equipment to minimize interferences and delays in execution of the work.
- B. Take care in erection and installation of equipment and materials to avoid marring finishes or surfaces. Any damage shall be repaired or replaced as determined by the A/E at no additional cost to the Owner.
- C. Equipment requiring electrical service shall not be energized or placed in service until A/E is notified and is present or have waived their right to be present in writing. Where equipment to be placed in service involves service or connection from another Contractor or the Owner, the Contractor shall notify the Owner in writing when the equipment will be ready. The Owner shall be notified as far in advance as possible of the date the various items of equipment will be complete.

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- D. Equipment supports shall be secured and supported from structural members except as field accepted by the A/E in writing.
- E. Plywood material shall not be used as a backboard for mounting panel boards, disconnects, motor starters, and dry type transformers. Provide "cast in place" type inserts or install expansion type anchor bolts. Electrical equipment shall not be mounted directly to dry wall for support without additional channels as anchors. Channels shall be anchored to the floor and structure above. Panelboards and terminal cabinets shall be provided with structural framing located within drywall partitions.
- F. The Contractor shall keep the construction site clean of waste materials and rubbish at all times. Upon completion of the work, the Contractor shall remove from the site all debris, waste, unused materials, equipment, etc.
- G. Inserts, pipe sleeves, supports, and anchorage of electrical equipment shall be provided. Where items are to be set or embedded in concrete or masonry, the items shall be furnished and a layout made prior to the setting or embedment thereof, so as to cause no delay to the project schedule.

1.17 PROGRESS AND RECORD DRAWINGS

- A. Keep two sets of blueline prints on the job, and neatly mark up design drawings each day as components are installed. Different colored pencils shall be used to differentiate each system of electrical work. Cost of prints and this labor task shall be included under this Division. All items on Progress Drawings shall be shown in actual location installed. Change the equipment schedules to agree with items actually furnished.
- B. Prior to request for substantial completion observation, furnish a set of neatly marked prints showing "as-installed" (as-built) condition of all electrical installed under this Division of the specifications. Marked up prints are to reflect all changes in work including change orders, field directives, addenda from bid set of Contract Documents, request for information responses, etc. Marked up set of prints to show:
  - 1. All raceways 1-1/2" and above, exactly as installed.
  - 2. All site raceways exactly as installed.
  - 3. Any combining of circuits (which is only allowed by specific written permission) or change in homerun outlet box shall be made on as-builts.
  - 4. Any circuit number changes on plan shall be indicated on as-builts.
  - 5. Any panelboard schedule changes shall be indicated on as-builts and final panelboard schedules..
- C. Marked up prints as noted above are to be submitted to A/E for review. Contractor shall review submitted "as-builts" with Engineer in the field. Contractor shall verify every aspect for accuracy.
- D. After acceptance of marked up prints by A/E with all changes, additions, etc. included on accepted marked up prints, submit set prior to request for final payment and/or request for final observation.
- E. Where the Contractor has failed to produce representative "as-built" drawings in accordance with requirements specified herein, the Contractor shall reimburse Engineer all costs to produce a set of "as-built" drawings to the Architect/Owner satisfaction.

1.18 "OBSERVATION OF WORK" REPORT

- A. Reference the General Conditions.
- B. Items noted by A/E or his representative during construction and before final acceptance which do not comply with the Contract Documents will be listed in a "Observation of Work" report which

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will be sent to the Contractor for immediate action. The Contractor shall correct all deficiencies in a prompt concise manner. After completion of the outstanding items, provide a written confirmation report for each item to the A/E. The report shall indicate each item noted, and method of correction. Enter the date on which the item was corrected, and return the signed reports so items can be rechecked. Failure to correct the deficiencies in a prompt concise manner or failure to return the signed reports shall be cause for disallowing request for payments.

- C. Items noted after acceptance during one-year guarantee period shall be checked by the Contractor in the same manner as above. The signed reports are to be returned by him when the items have been corrected.

1.19 SYSTEMS WARRANTY

- A. Reference the General Conditions.
- B. The work shall include a one-year warranty. This warranty shall be by the Contractor to the Owner for any defective workmanship or material which has been furnished at no cost to the Owner for a period of one year from the date of substantial completion of each System. Warranty shall not include lamps in service after one month from date of substantial completion of the System. Explain the provisions of warranty to the Owner at the "Demonstration of Completed System" meeting to be scheduled with the Owner upon project completion.
- C. Where items of equipment or materials carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material.
- D. Where extended warranty or guarantee are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.
- E. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work which shall not alter the Contractor's warranty.

1.20 WASTE MATERIALS DISPOSAL

- A. Contractor shall include in his bid the transport and disposal or recycling of all waste materials generated by this project in accordance with all rules, regulations and guidelines applicable. Contractor shall comply fully with Florida statute 403.7186 regarding mercury containing devices and lamps. Lamps, ballasts and other materials shall be transported and disposed of in accordance with all DEP and EPA guidelines applicable at time of disposal. Contractor shall provide owner with written certification of accepted disposal.

1.21 SUBSTANTIAL COMPLETION

- A. The Contractor shall be fully responsible for contacting all applicable parties to schedule required observations of the work by Engineer. A minimum of 72 hours notice shall be given for all required observations of the work by Engineer, and minimum of 120 hours for substantial completion observation. Time and date shall be agreed on by all applicable parties in writing.
- B. Work shall be complete as required by authorities having jurisdiction and the general conditions of the contract prior to request for substantial completion observation. Work must be deemed substantially complete by A/E to fulfill requirements.

1.22 PROHIBITION OF ASBESTOS AND PCB

- A. The use of any process involving asbestos or PCB, and the installation of any product, insulation, compound of material containing or incorporating asbestos or PCB, is prohibited. The requirements of this specification for complete and operating electrical systems shall be met without the use of asbestos or PCB.
- B. Prior to the final review field visit, the Contractor shall certify in writing that the equipment and

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materials installed in this Project under Division 26 contain no asbestos or PCB's. Additionally, all manufacturers shall provide a statement with their submittal that indicates that their product contains no asbestos or PCB's. This statement shall be signed and dated by a duly authorized agent of the manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

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SECTION 26 05 06 - DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the requirements for demonstration of completed electrical systems:
- B. Demonstrate to Owner the essential features of the following electrical systems:
  - 1. Communications Systems
    - a) Each system included in Systems sections.
  - 2. Miscellaneous Electrical Equipment
    - a) Elevator Controls and Cab Lighting
    - b) Motor control devices
    - c) Relays
    - d) Starting devices
    - e) Surge suppression equipment
  - 3. Lighting Fixtures (include relamping and replacing lenses)
    - a) Fixtures, indoor and outdoor
  - 4. Wiring Devices
    - a) Low-voltage controls
    - b) Switches: regular, time
- C. Upon completion of testing, each system is to be demonstrated only once.

1.3 TIME

- A. The demonstration shall be held upon completion of testing of all systems at a date to be agreed upon in writing by the Owner or his representative.

1.4 ATTENDING PARTIES

- A. The demonstration shall be held by this Contractor in the presence of the Owner and the manufacturer's representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DEMONSTRATION

- A. Demonstrate the function and location (in the structure) of each system, and indicate its relationship to the riser diagrams and drawings.
- B. Demonstrate by "start-stop operation" how to work the controls, how to reset protective devices, how to replace fuses, and what to do in case of emergency.
- C. Performance Verification and Demonstration to Owner
  - 1. Submit Check Out Memo form for each item, equipment and system. Copy to be included in each Operation and Maintenance Manual.

END OF SECTION

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**CHECK OUT MEMO**

Check Out Memo shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration Meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name \_\_\_\_\_

Type of Equipment Checked \_\_\_\_\_

Equipment Number \_\_\_\_\_

Equipment Manufacturer \_\_\_\_\_

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.\*
3. Written operating and maintenance information has been presented and reviewed in detail with the Contractor.
4. Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

CHECKED BY:

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE (print)

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
TELEPHONE, FAX, E-MAIL

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE (signature, title)

\_\_\_\_\_  
DATE CHECKED

WITNESSED BY:

\_\_\_\_\_  
CONTRACTOR'S REPRESENTATIVE (signature, title)

\*EXCEPTIONS NOTED AT TIME OF CHECK-OUT (USE ADDITIONAL PAGE IF NECESSARY)



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SECTION 26 05 07 – SUBMITTALS FOR ELECTRICAL

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Requirements for submittals specifically applicable to Division 26 Sections.
- B. See Section Submittal Procedures for additional requirements when submittal consists of accepted substitution equipment.

1.3 SUBMITTAL OF "ACCEPTED SUBSTITUTE" EQUIPMENT/PRODUCT

- A. Representation: In submitting item, equipment, product, etc. that has been listed on contract drawings, in contract documents or in an addenda, Contractor represents that he:
  - 1. Has investigated substituted item and has determined that it is equal or superior to specified product in all aspects and that use of substituted item will not require any additional time to the Contract.
  - 2. Will coordinate installation of accepted substitution into work, making changes as may be required to complete work in all aspects.
  - 3. Waives all claims for additional costs related to substitution which may subsequently become apparent.
  - 4. Will provide the same warranties for the substitution as for the product specified.
  - 5. Will absorb all costs incurred by the substitution when affecting other trades including but not limited to electrical, structural, architectural, etc.
  - 6. Will absorb any cost incurred by the Engineer in review of the substituted product if the acceptance of the substituted item creates the need for system modification and/or redesign, or if the substituting contractor exhibits negligence in his substituting procedure thus submitting inferior, misapplied or miss-sized equipment. In the event of additional engineering costs, the billing structure shall be agreed upon prior to review by all involved parties.
- B. Substitutions that cannot meet space requirements or other requirements of these Specifications, whether accepted or not, shall be replaced at the Contractor's expense with no additional time added to the Contract.

1.4 SUBMITTALS

- A. Submittals shall consist of a minimum of one view type 3-ring binder, white, sized to hold 8-1/2" x 11" sheets for "ELECTRICAL SUBMITTALS" (Power and Lighting).
  - 1. Binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1", maximum spline size to be 3" (provide additional binders if 3" size is not sufficient to properly hold submittals).
  - 2. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for Submittals included at end of this Section. Description sheet is to be white with black letters, minimum of 11" high and full width of pocket. Description is to describe project and match project drawing/project manual description. Description to include submittal type, i.e., "ELECTRICAL SUBMITTALS" for Power and Lighting.

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- B. Submittals Binders to include:
1. First sheet shall be prepared and filled out by Contractor and shall list project addresses, telephones, etc.; see "PROJECT ADDRESSES" Form included at end of this section.
  2. Second sheet in binder shall be a photocopy of the Electrical Index pages in Specifications.
  3. Provide reinforced separation sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule.
  4. Submittals consisting of marked catalog sheets or shop drawings shall be inserted in the binder in proper order. Submittal data shall be presented in a clear and thorough manner. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Markings shall be made with arrows or circles (highlighting is not acceptable).
  5. Shop Drawings: Drawings to include identification of project and names of Architect, Engineer, General Contractor, subcontractor and supplier, data, number sequentially and indicate the following:
    - a) Fabrication and erection dimensions.
    - b) Arrangements and sectional views.
    - c) Necessary details, including complete information for making connections with other work.
    - d) Kinds of materials and finishes.
    - e) Descriptive names of equipment.
    - f) Modifications and options to standard equipment required by the work.
    - g) Leave blank area, size approximately 4 by 2 1/2 inches, near title block (for A/E's stamp imprint).
    - h) In order to facilitate review of drawings, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and specification paragraph numbers where items occur in the Contract Documents.
    - i) Conduit/raceway rough-in drawings.
    - j) Items requiring shop drawings include (but not limited to):
      1. Lightning protection system
      2. Special built light fixtures
      3. Each section of fire alarm, television, etc..
      4. UPS systems
      5. Emergency generator systems
      6. Special and/or modified equipment
      7. Main switchboard(s)
      8. U.L. listed fire and smoke stopping assemblies for each applicable penetration
    - k) See specific sections of Specifications for further requirements.
  6. Product Data: Technical data is required for all items as called for in the Specifications regardless if item furnished is as specified.

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- a) Submit technical data verifying that the item submitted complies with the requirements of the Specifications. Technical data shall include manufacturer's name and model number, dimensions, weights, electrical characteristics, and clearances required. Indicate all optional equipment and changes from the standard item as called for in the Specifications. Furnish drawings, or diagrams, dimensioned and in correct scale, covering equipment, showing arrangement of components and overall coordination.
- b) In order to facilitate review of product data, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and/or specification paragraph numbers where and/or what item(s) are used for and where item(s) occur in the contract documents.
- c) See specific sections of Specifications for further requirements.

1.5 PROCESSING SUBMITTALS

- A. Submit under provisions of the General Requirements of the Contract and this section of the Specifications, whichever is the most strict.
- B. Quantity of submittals with marking on each copy shall be submitted under provisions of General Requirements of the Contract, Division 1, and this and other sections of the Specifications. Original submittal must contain 3-ring binders with:
  - 1. Project Addresses
  - 2. Index
  - 3. Separation Sheets
  - 4. Basic Materials
  - 5. Panelboards
  - 6. Light Fixtures
  - 7. Long Lead Items
  - 8. Systems Product Data
- C. Remainder of submittals are to be submitted no later than 60 days after award of contract or 60 days prior to Request for Substantial Completion whichever is earlier.
- D. The Contractor shall review all submittals before submitting to the A/E. No request for payment will be considered until the submittals have been reviewed and submitted for approval.
- E. Product Data: For standard manufactured materials, products and items, submit one (1) copy or sets of data (per binder). If submittal is rejected, resubmittal shall contain same quantity of new data.
- F. Shop Drawings: For custom fabricated items and systems shop drawings, initially submit a transparency (suitable for reproduction) together with two (2) prints made therefrom. When submittal is acceptable, furnish one (1) print per binder made from the accepted transparency.
- G. Shop Drawing Review Notation.

<u>Action</u>	<u>Description</u>
1. No Exception Noted	No exceptions taken. Resubmittal not required.
2. Rejected	Not in compliance with Contract Documents. Resubmit.
3. Submit Specific Item	Resubmit item as specified.

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- |    |                        |  |
|----|------------------------|--|
| 4. | Make Corrections Noted | Make corrections noted, resubmittal not required.                      |
| 5. | Revise and Resubmit    | Make corrections noted, resubmittal is required                        |
| 6. | Review not Required    | Not required for review. No action taken. Copy retained for reference. |
- H. Acceptance: When returned to Contractor, submittals will be marked with A/E's stamp. If box marked "Rejected" "Revise and Resubmit" or "Submit Specific Item" is checked, submittal is not accepted and Contractor is to correct and resubmit as noted, otherwise submittal is accepted and Contractor is to comply with notation making necessary corrections on submittal. Review comments will generally not be on each individual submittal sheet, and will be on a separate sheet attached to shop drawing transmittal, submittal as a whole or each submittal section.
- I. Note that the acceptance of shop drawings or other information submitted in accordance with the requirements specified above, does not assure that the Engineer, Architect, or any other Owner's Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved, the ability of the material or equipment involved or the Mechanical/Electrical performance of equipment. Acceptance of shop drawings does not invalidate the plans and Specifications if in conflict, unless a letter requesting such change is submitted and accepted on the Engineer's letterhead.
- 1.6 DELAYS
- A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.
- 1.7 RE-SUBMITTALS
- A. The A/E shall be reimbursed for all costs to review resubmittals subsequent to the second submission for the same product. Cost will be billed to Contractor at Engineer's standard hourly rate.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

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SHERIFF SECTOR IV ELEVATOR MODERNIZATION

PROJECT ADDRESSES

OWNER:

ARCHITECT:

ENGINEER:

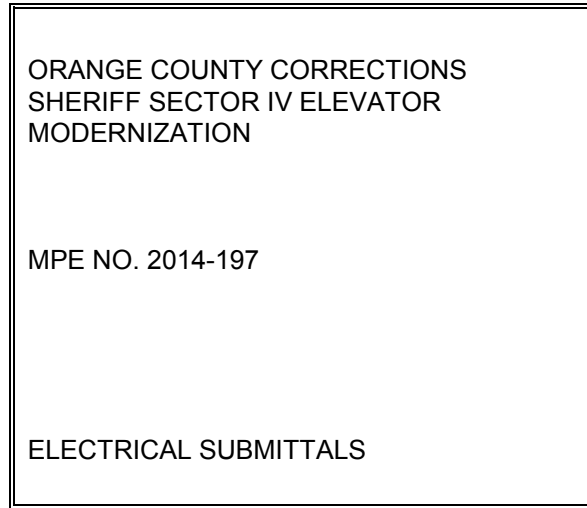
Matern Professional Engineering, Inc.  
130 Candace Drive  
Maitland, Florida 32751  
Telephone No.: (407) 740-5020  
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GENERAL CONTRACTOR:

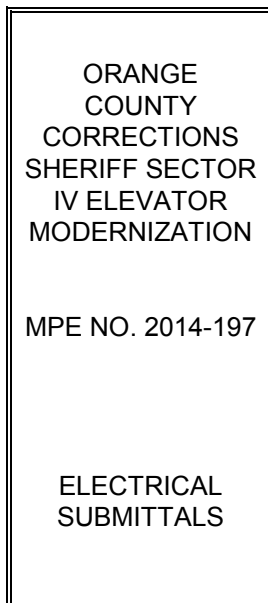
SUBCONTRACTOR:

ORANGE COUNTY CORRECTIONS  
SHERIFF SECTOR IV ELEVATOR MODERNIZATION

BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder



(Size To 8-1/2" x 11")



(Size To 11")

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SECTION 26 05 09 - REFERENCE STANDARDS AND REGULATORY REQUIREMENTS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Reference Standards and Regulatory Requirements applicable to Divisions 26, 27 28 sections.

1.3 REFERENCES

- A. The following references may be referenced within these specifications:

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AHERA	Asbestos Hazard Emergency Response Act
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	ASME International American Society of Mechanical Engineers International
ASTM	ASTM International American Society for Testing and Materials International
BICSI	BICSI, Inc.
CRSI	Concrete Reinforcing Steel Institute
EIA/TIA	Electronics Industries Alliance/Telecommunications Industry Association
EJCDC	Engineers Joint Contract Documents Committee American Consulting Engineers Council
FAC	Florida Administrative Code
FBC	Florida Building Code
FCC	Federal Communications Commission
FFPC	Florida Fire Prevention Code
FLA	State of Florida
FMC	Florida Building Code (Mechanical)

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FMG	FM Global (formerly Factory Mutual System)
FPC	Florida Building Code (Plumbing)
FS	Florida Statutes
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers, Inc
IES	Illumination Engineering Society of North America
LTCR	Local Telephone Company Requirements
NEC	National Electrical Code
NECPA	National Energy Conservation Policy Act
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFSRS	Uniform Fire Safety Rules and Standards of Insurance Division of State Fire Marshal
UL	Underwriters Laboratories, Inc.

1.4 REGULATORY REQUIREMENTS

A. Conform to all the applicable requirements of the following codes, standards, guidelines, etc.. If there should be conflicting requirements between these codes, standards, guidelines, etc., the more or most stringent requirement shall apply that does not violate any codes or laws.

1. Standards and Miscellaneous Codes/Requirements (Comply with latest edition or notice available unless otherwise adopted by Authority Having Jurisdiction):

- a) Americans with Disabilities Act of 1990, as amended
- b) ADA Standards for Accessible Design, 2010
- c) American National Standards Institute
- d) American Society of Heating, Refrigerating and Air Conditioning Engineers
- e) American Society of Mechanical Engineers
- f) American Society for Testing and Materials
- g) Concrete Reinforcing Steel Institute
- h) Department of Community Affairs
- i) Electronics Industries Association/Telecommunications Industry Association
- j) Florida Building Code, 5<sup>th</sup> edition 2014
- k) Florida Fire Prevention Code, 5<sup>th</sup> edition 2014



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- l) Institute of Electrical and Electronics Engineers
- m) Illumination Engineering Society
- n) Lightning Protection Institute
- o) Local Telephone Company Requirements
- p) National Electrical Code, 2011
- q) National Energy Conservation Policy Act
- r) National Electrical Safety Code
- s) National Electrical Manufacturers Association
- t) NFPA 1 Fire Code, 2012
- u) NFPA 101 Life Safety Code, 2012
- v) Occupational Safety and Health Act
- w) Safety Code for Elevators and Escalators  
A17.1a, 2008 and A17.1b, 2009 Addenda
- x) Safety Code for Existing Elevators and Escalators  
A17.3, 1996
- y) Sheet Metal and Air Conditioning Contractors
- z) Underwriters Laboratories, Inc.
- aa) Applicable Federal, State, Local Codes, Laws and Ordinances, Florida Statutes  
and Referenced Codes/Standards

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 26 05 10 - ELECTRICAL SYMBOLS AND ABBREVIATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Symbols and abbreviations specifically applicable to all Division 26 27 28 sections in addition to those in Division 01 - General Requirements and any supplemental requirements/conditions.

1.3 SYMBOLS

- A. In general the symbols used on the drawings conform to the Standard Symbols of the Institute of Electrical and Electronic Engineers with the exception of special systems or agencies as hereinafter noted.
  - Corps of Engineers.
  - Special Symbols as shown in schedules or legends.

1.4 ABBREVIATIONS

- A. The following abbreviations or initials are used.

A/C	Air Conditioning
AFD	Adjustable Frequency Drive
A.C.	Alternating Current
ADD #	Addendum #
A/E	Architect/Engineer (or Engineer when Architect not applicable)
AFF	Above Finished Floor
AFG	Above Finished Grade
AHU	Air Handler Unit
AIC	Amps Interrupting Capacity
AL	Aluminum
ALT	Alternate
AMP	Ampere
ANSI	American National Standards Institute
AWG	American Wire Gauge
@	At
B.C.	Bare Copper
BIDS	Baggage Information Display System
BLDG	Building
BRKR	Breaker
BTU	British Thermal Unit
BTUH	BTU Per Hour
C.	Conduit
C.B.	Circuit Breaker
CBM	Certified Ballast Manufacturers
cd	Candela
CFM	Cubic Feet per Minute
CKT.	Circuit
CKT BRKR	Circuit Breaker
C/L	Center Line
Clg.	Ceiling

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Comp.	Compressor
Conn.	Connection
Cond.	Condenser
Cont.	Continuous
C.R.I.	Color Rendering Index
C.T.	Current Transformer
CU.	Copper
C.U.	Compressor Condenser Unit
C.W.	Cold Water
D.B.	Direct Burial
D.C.	Direct Current
Disc.	Disconnect
DN.	Down
DPST	Double Pole Single Throw
DWG	Drawing
E.C.	Electrical Contractor (or General Contractor)
ELEV.	Elevator
EMT	Electrical Metallic Tubing
Equip.	Equipment
EST	Estimate
FAAP	Fire Alarm Annunciator Panel
FACP	Fire Alarm Control Panel
FARP	Fire Alarm Remote Panel
FATC	Fire Alarm Terminal Cabinet
FCCP	Fire Alarm Command Center Panel
FHC	Fire Hose Cabinet
FIDS	Flight Information Display System
FLA	Full Load Amperes
FT.	Feet
FLR	Floor
F.C.	Footcandles
FVNR	Full Voltage Non-Reversing
GAL.	Gallon
Galv.	Galvanized
GPH	Gallons per Hour
GPM	Gallons per Minute
GFI	Ground Fault Interrupting
GRS	Galvanized Rigid Steel Conduit
GND.	Ground
HTG	Heaters
HT	Height
HZ	Hertz (Cycles)
HPF	High Power Factor
HPS	High Pressure Sodium
HP	Horsepower
HR	Hour
H.S.	Heat Strip
IMC	Intermediate Metallic Conduit
Incand.	Incandescent
in.	Inches
J.B.	Junction Box
KVA	KiloVolt Ampere
KW	Kilowatts
KWH	Kilowatt Hour

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K	Kelvin
L.L.D.	Lamp Lumen Depreciation
LED	Light Emitting Diode
LIU	Light Interface Unit (Fiber Optic Patch Panel)
LT.	Light
LTG.	Lighting
LTS.	Lights
L.P.F.	Low Power Factor
M.C.B.	Main Circuit Breaker
M.L.O.	Main Lugs Only
Maint.	Maintenance
MH.	Manhole; Metal Halide
MFG.	Manufacturer
max.	Maximum
MCM/KCMIL	Thousand Circular Mils
MPH	Miles Per Hour
MM	Millimeter
Min.	Minimum
MCP	Motor Circuit Protector
MTD	Mounted
N.	Neutral
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
N.P.T.	National Pipe Thread
NF	Non Fused
N.C.	Normally Closed
N.O.	Normally Open
NIC.	Not in Contract
No.	Number
OB	Outlet Box
OD	Outside Diameter
O.L.	Overload
OLS	Overloads
OS&Y	Outside Screw and Yoke (Sprinkler)
%	Percent
Ø	Phase
P.	Pole
PL	Compact Fluorescent Lamp
P.T.	Potential Transformer
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PB	Pullbox
PNL	Panel
PR	Pair
Pri.	Primary
PTZ	Pan, Tilt, Zoom
PVC	Polyvinyl Chloride
Recept.	Receptacle
RPM	Revolutions per Minute
R.S.	Rapid Start
SCA	Short Circuit Amps
Sec.	Secondary
SHT	Sheet

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S/N	Solid Neutral
SPST	Single Pole Single Throw
SF	Square Foot
SW.	Switch
SWBD	Switchboard
Sys.	System
THHN; THWN	Nylon Jacketed Wire
TSP	Twisted Shielded Pair
TTB	Telephone Terminal Board
TTC	Telephone Terminal Cabinet
TV	Television
TVTC	Television Terminal Cabinet
TVEC	Television Equip. Cabinet
TYP	Typical
Temp.	Temperature
U.L.	Underwriters' Laboratories
UTP	Unshielded Twisted Pair
V	Volt
VA	Volt Amperes
Vol.	Volume
W	Wire
W.P.	Weatherproof
XFMR	Transformer
Y	Wye
3R	Rainproof
4X	Stainless Steel Dusttight, Watertight

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 26 05 19 - BUILDING WIRE AND CABLE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for provision and installation of building wire and cable.
- B. Provide all equipment, labor, material, accessories, and mounting hardware to properly install all conductors and cables rated 600 volts and less for a complete and operating system for the following:
  - 1. Building wire and cable.
  - 2. Wiring connectors and connections.
- C. No aluminum wiring shall be permitted.
- D. All sizes shall be given in American Wire Gauge (AWG) or in thousand circular mils (MCM/kcmil).

1.3 REFERENCES:

- A. ANSI/NFPA 70 National Electrical Code
- B. UL 486A-486B

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

- A. Product Data: Submit catalog cut sheet showing, type and UL listing of each type of conductor, connector and termination.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years experience.

1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.8 COORDINATION

- A. Determine required separation between cable and other work.
- B. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

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2.1 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: ANSI/NFPA 70, Type THHN/THWN and XHHW.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install products in accordance with manufacturer's instructions.
- B. Conductors #10 AWG or #12 AWG shall be 600 volt type THWN/THHN unless noted otherwise, rated 90 degrees C. dry, 75 degrees C. wet.
- C. Conductors #8 AWG and larger shall be Type THWN-2/THHN unless noted otherwise, rated 90 degrees C, wet or dry.
- D. Use solid conductor for feeders and branch circuits 10 AWG and smaller (except for control circuits).
- E. Use conductor no smaller than 12 AWG for power and lighting circuits.
- F. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- G. All conductors shall be installed in raceway.
- H. Conductor sizes indicated on circuit homeruns or in schedules shall be installed over the entire length of the circuit, unless noted otherwise on the Drawings or in these Specifications.
- I. Before installing raceways and pulling wire to any mechanical equipment, verify electrical characteristics with final submittal on equipment to assure proper number and AWG of conductors. (As for multiple speed motors, different motor starter arrangements, etc.).
- J. Coordinate all wire sizes with lug sizes on equipment, devices, etc. Provide/install lugs as required to match wire size.
- K. Where oversized conductors are called for (due to voltage drop, etc.) provide/install lugs as required to match conductors, or provide/install splice box, and splice to reduce conductor size to match lug size.

3.2 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire has been completed.

3.3 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.4 WIRING METHODS

- A. Use only building wire type (THHN/THWN for #10 and #12 and THHN/THWN-2 for #8 and larger) insulation in raceway, unless noted otherwise.
- B. Wiring in vicinity of heat producing equipment: Use only XHHW insulation in raceway.
- C. Conductors installed within fluorescent fixture channels shall be Type THHN or XHHW rated 90 degrees C dry. Conductors for all other light fixtures shall have temperature ratings as required to meet the UL listing of the fixture; however, in no case shall the temperature rating be less than 90 degrees Centigrade. Remove incorrect insulation types in new work.

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3.5 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 26 05 53 Identification for Electrical Systems.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.
- C. Identify neutrals with its associated circuit number(s).

3.6 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of the General Requirements of the Contract Documents and Section 26 08 13 Tests and Performance Verification.
- B. Inspect wire for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

3.7 PULLING

- A. No wire shall be pulled until the conduit system is complete from pull point to pull point and major equipment terminating conduits have been fixed in position.
- B. Mechanical pulling devices shall not be used on conductors sized #8 and smaller. Pulling means which might damage the raceway shall not be used.
- C. Use only powdered soapstone or other pulling lubricant acceptable to the Architect/Engineer. Compound or lubricant shall not cause the conductor or insulation to deteriorate.
- D. All conductors to be installed in a common raceway shall be pulled together. The manufacturer's recommended pulling tensions shall not be exceeded.
- E. Bending radius of insulated wire or cable shall not be less than the minimum recommended by the manufacturer.

3.8 CONTROL AND SIGNAL CIRCUITS

- A. For control and signal circuits above 50 VAC, conductors shall be #14 AWG minimum size, Type XHHW or THWN-THHN as permitted by NFPA 70, within voltage drop limits, increased to #12 AWG as necessary for proper operation.
- B. For control and signal circuits 50 VAC and below, conductors, at the Contractor's option, may be #16 AWG, 300 volt rated, PVC insulated, except where specifically noted otherwise in the Contract Documents.
- C. Conductor insulation for fire alarm systems shall be as accepted by Code Inspection Authority only. Wire acceptance by the Architect/Engineer shall not supersede this final acceptance for conditions of this specific project.
- D. Install circuit conductors in conduit.
- E. Circuit conductors to be stranded.

3.9 COLOR CODING

- A. All power feeders and branch circuits No. 6 and smaller shall be wired with color-coded wire with the same color used for a system throughout the building. Power feeders above No. 6 shall either be fully color-coded or shall have black insulation and be similarly color-coded with tape or paint in all junction boxes and panels. Tape or paint shall completely cover the full length of conductor insulation within the box or panel.
- B. Unless otherwise accepted or required by Architect/Engineer to match existing, color-code shall be as follows:



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Neutrals: 120/208V system white; 277/480V system natural grey  
Ground Wire: green, bare  
Isolated Ground Wire: green with yellow stripes  
120/208V: Phase A black, Phase B red, Phase C blue  
277/480V: Phase A brown, Phase B orange, Phase C yellow.

- C. All switchlegs, other voltage system wiring, control and interlock wiring shall be color-coded other than those above.

3.10 TAPS/SPLICES/CONNECTORS/TERMINATIONS

- A. Clean conductor surfaces before installing lugs and connectors.
- B. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- C. Power and lighting conductors shall be continuous and unspliced where located within conduit. Splices shall occur within troughs, wireways, outlet boxes, or equipment enclosures where sufficient additional room is provided for all splices. No splices shall be made in in-ground pull boxes (without written acceptance of engineer).
- D. Splices in lighting and power outlet boxes, wireway, and troughs shall be kept to a minimum. Pull conductors through to equipment, terminal cabinets, and devices.
- E. No splices shall be made in junction box, and outlet boxes (wire No. 8 and larger) without written acceptance of Engineer.
- F. No splices shall be made in communications outlet boxes, pull boxes or wireways (i.e., fire alarm, computer, telephone, intercom, sound system, etc.) without written acceptance of Engineer. Pull cables through to equipment cabinets, terminal cabinets and devices.
- G. Allow adequate conductor lengths in all junction boxes, pull boxes and terminal cabinets. All termination of conductors in which conductor is in tension will be rejected and shall be replaced with conductors of adequate length. This requirement shall include the Contractor to provide sleeve type vertical cable supports in vertical raceway installations, provided in pullboxes at proper vertical spacings.
- H. A calibrated torque wrench shall be used for all bolt tightening.
- I. Interior Locations:
  - 1. All (non-electronic systems) copper taps and splices in No. 8 or smaller shall be fastened together by means of "spring type" connectors. All taps and splices in wire larger than No. 8 shall be made with compression type connectors and taped to provide insulation equal to wire.
- J. Exterior Locations:
  - 1. Make splices, taps and terminations above grade in splice or termination cabinets. Do not splice any cable in ground or below finished grade.
  - 2. All taps and splices shall be made with compression type connectors and covered with Raychem heavywall cable sleeves (type CRSM-CT, WCSM or MCK) with type "S" sealant coating with sleeve kits as per manufacturer's installation instructions or be terminated/connected to terminal strips in above grade terminal boxes suitable for use.
  - 3. Provide and install above grade termination cabinets sized to meet applicable codes and standards, where required for splicing.

END OF SECTION

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SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes
  - 1. Equipment grounding conductors.
  - 2. Bonding.
- B. Provide all labor, materials, and equipment necessary to properly install a grounding system conductor in all new branch wiring and feeder installations, which shall be in full compliance with all applicable codes as accepted by the Authorities Having Jurisdiction. The secondary distribution system shall include a grounding conductor in all raceways in addition to the return path of the metallic conduit.
- C. In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated or bare copper system grounding conductor in accordance with specific rules of NEC 250, and state codes. Bonding conductor through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.
- D. All raceways shall have an insulated copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC. Grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings. Grounding conductors that run with feeders in PVC conduit outside of building(s) shall be bare only.
- E. Provide and install all grounding and bonding as required by the National Electrical Code (NEC) including but not limited to NEC 250.

1.3 REFERENCES

- A. ANSI/NFPA 70 National Electrical Code
- B. NFPA 780 Standard for the Installation of Lightning Protection Systems
- C. UL 467 Grounding and Bonding Equipment

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

- A. Submit catalog cut sheets/product data on:
  - 1. Ground bus bars and associated components.
  - 2. Testing equipment and procedures
- B. Product data shall prove compliance with specifications, National Electrical Code, manufacturers' specifications, and written installation data.

1.6 PROJECT RECORD DOCUMENTS

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- A. Submit record documents to accurately record actual locations of grounding electrodes.
- B. Submit test results of each ground rod. See Section Tests and Performance Verification of Electrical System.

PART 2 - PRODUCTS

2.1 WIRE

- A. Material: Stranded copper.
- B. Size: Size to meet NFPA 70 requirements as a minimum, increase size if called for on drawings, in these specifications, or as required for voltage drop.
- C. Insulated THWN (or bare as noted elsewhere).

PART 3- EXECUTION

3.1 GENERAL

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding electrodes conductor, bonding conductors, ground rods, etc. with all required accessories.
- C. Grounding shall meet (or exceed as required to meet these specifications) all the requirements of the NEC, the NFPA, and applicable standards of IEEE.
- D. Where there is a conflict between these specifications and the above applicable codes/standards, or between this section of these specifications and other sections, then the most stringent or excessive requirement shall govern. Where there is an omission of a code/standard requirement in these specifications, then the code/standard requirements shall be complied with.
- E. Requirement in these specifications to comply with a specific code/standard article, etc. is not to be construed as deleting of requirements of other applicable codes/standards and their articles, etc.

3.2 EQUIPMENT GROUNDING CONDUCTOR

- A. Grounding conductors shall be provided with every circuit to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250.
- B. At every voltage level, new portions of the electrical power distribution system shall be grounded with a dedicated copper conductor, which extends from termination back to power source in supply panelboard.
- C. Provide separate, insulated (bare if with feeder in PVC conduit outside of building(s)) conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- D. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a ground conductor sized as indicated and where not shown shall be sized to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250. Conductor shall be connected to the equipment grounding bus in switchboards and panelboards, to the grounding bus in all motor control centers, and as specified, to lighting fixtures, motors and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and shall be properly connected thereto, using a lug device located within each item enclosure at the point of electric power connections to permit convenient inspection.
- E. Provide green insulated ground wire for all grounding type receptacles and for equipment of all voltages. In addition to grounding strap connection to metallic outlet boxes, a supplemental grounding wire and screw equal to Raco No. 983 shall be provided to connect receptacle ground

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terminal to the box.

- F. All plugstrips and metallic surface raceway shall contain a green insulation ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.
- G. Where integral grounding conductor is specified elsewhere in bus duct construction, provide equivalent capacity conductor from supply switchboard or panelboard grounding bus to the bus duct grounding conductor. Bond integral conductor to bus duct enclosure at each tap and each termination.
- H. All motors, all heating coil assemblies, and all building equipment requiring flexible connections shall have a green grounding conductor properly connected to the frames and extending continuously inside conduit with circuit conductors to the supply source bus with accepted connectors regardless of conduit size or type. This shall include Food Service equipment, Laundry equipment, and all other "Equipment By Owner" to which an electric conduit is provided under this Division.

3.3 MAIN ELECTRICAL SERVICE

- A. Existing Buildings:
  - 1. Contractor shall verify that each building's electrical service is properly grounded as required by the NEC.
- B. Complete installation shall meet and exceed the requirements of the NEC 250.
- C. Artificial electrodes shall be provided for the main service in sufficient number and configuration to secure resistance specified.
- D. Provide and bond to all of the following:
  - 1. Building metal frame, structural steel and/or reinforced structural concrete.

3.4 EXTERIOR GRADE (OR FREE STANDING ABOVE GROUND) MOUNTED EQUIPMENT

- A. General:
  - 1. All equipment (including chillers, pumps, disconnects, starters, control panels, panels, etc) mounted exterior to building shall have their enclosures grounded directly to a grounding electrode at the equipment location in addition to the building equipment ground connection.
  - 2. Bond each equipment enclosure, metal rack support, mounting channels, etc. to ground electrode system at each rack with an insulated copper ground conductor sized to match the grounding electrode conductor required by applicable table in NEC 250 based on equipment feeder size, but in no case shall conductor be smaller than #6 copper or larger than #2 copper. This connection is in addition to grounding electrode connections required for services.
- B. Electrical sub service rack mounted equipment.
  - 1. Ground per "Main Electrical Service," except do not bond neutral to ground.
  - 2. Bond all metal parts as noted above.
- C. Electrical equipment connection rack mounted equipment.
  - 1. Bond all metal parts as noted above.
- D. Complete installation shall exceed the minimum requirements of NEC 250 and, when applicable, NFPA 780.

3.5 LIGHTING FIXTURES

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- A. All new and removed/reinstalled fixtures in building interior, and exterior fixtures shall be provided with green grounding conductor, solidly connected to unit. Individual fixture grounds shall be with lug to fixture body, generally located at point of electrical connection to the fixture unit.
- B. All suspended fixtures and those supplied through flexible metallic conduit shall have green ground conductor from outlet box to fixture. Cord connected fixtures shall contain a separate green ground conductor.

3.6 PULLBOX GROUNDING.

- A. The complete installation shall exceed the minimum requirements of the NEC.

3.7 HAZARDOUS LOCATIONS

- A. Ground in hazardous locations shall be done in accordance with applicable portions of NEC 500, 501, 502, 503, 511 and 514.

3.8 MISCELLANEOUS GROUNDING CONNECTIONS

- A. Provide bonding to meet regulatory requirements.
- B. Required connections to building steel shall be with UL accepted non-reversible crimp type ground lugs exothermically welded to bus bar that is either exothermically welded to steel or bolted to steel in locations where weld will affect the structural properties of the steel. Required connections to existing building structural steel purlins/l beams shall be with heavy duty bronze "C" clamp with two bolt vise-grip cable clamp.
- C. Grounding conductors shall: be installed to permit the shortest and most direct path from equipment to ground; be installed in conduit; be bonded to conduit at both ends when conduit is metal; have connections accessible for inspection; and made with accepted solderless connectors brazed (or bolted) to the equipment or to be grounded; in NO case be a current carrying conductor; have a green jacket unless it is bare copper; be run in conduit with power and branch circuit conductors. The main grounding electrode conductor shall be exothermically welded to ground rods, water pipe, and building steel.
- D. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Metal rustproofing shall be removed at grounding contact surfaces, for 0 ohms by digital Vm. Exposed bare metal at the termination point shall be painted.
- E. All ground connections that are buried or in otherwise inaccessible locations, shall be welded exothermically. The weld shall provide a connection which shall not corrode or loosen and which shall be equal or larger in size than the conductors joined together. The connection shall have the same current carrying capacity as the largest conductor.
- F. Install ground bushings on all metal conduits entering enclosures where the continuity of grounding is broken between the conduit and enclosure (i.e. metal conduit stub-up into a motor control center enclosure or at ground bus bar). Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.
- G. Install ground bushings on all metal conduits where the continuity of grounding is broken between the conduit and the electrical distribution system (i.e. metal conduit stub-up from wall outlet box to ceiling space. Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.
- H. Each feeder metallic conduit shall be bonded at all discontinuities, including at switchboards and all subdistribution and branch circuit panels with conductors in accordance with applicable table in NEC 250 for parallel return with respective interior grounding conductor.

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- I. Grounding provisions shall include double locknuts on all heavywall conduits.
- J. Bond all metal parts of pole light fixtures to ground rod at base.

3.9 COMMUNICATIONS SYSTEMS

- A. Provide and install all grounding as required by NEC Article 800 and where available on project: Articles 810 (Radio and Television Equipment); 820 (Community Antenna Television and Radio Distribution Systems); and 830 (Network-Powered Broadband Communications Systems).
- B. Provide and install grounding electrode at point of entry of communication cables and bond to service entrance grounding electrodes per NEC 800. Install ground bus bar at point of entry of communications cable and connect electrode to ground bus. Connect communications cable metal sheath and surge protection devices to ground bar.

3.10 TESTING AND REPORTS

- A. Raceway Continuity: Metallic raceway system as a component of the facilities ground system shall be tested for electrical continuity. Resistance to ground throughout the system shall not exceed specified limits.
- B. Ground resistance measurements shall be made on each system utilized in the project. The ground resistance measurements shall include building structural steel, driven grounding system, water pipe grounding system and other accepted systems as may be applicable. Ground resistance measurements shall be made in normally dry weather, not less than twenty-four hours after rainfall, and with the ground under test isolated from other grounds and equipment. Resistances measured shall not exceed specified limits.
- C. Upon completion of testing, the testing conditions and results shall be certified by the Contractor and submitted to the Architect/Engineer as called for in Section 26 08 13 Tests and Performance Verification.

3.11 INTERFACE WITH OTHER PRODUCTS

- A. Interface with communications system installed under systems sections series specification sections.

3.12 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

END OF SECTION

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SECTION 26 05 29 - HANGERS AND SUPPORTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Conduit and equipment supports.
  - 2. Anchors and fasteners.
- B. Furnish and install all supports, hangers and inserts required to mount fixtures, conduit, cables, pullboxes and other equipment furnished under this Division.

1.3 REFERENCES

- A. NECA National Electrical Contractors Association
- B. ANSI/NFPA 70 National Electrical Code

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

PART 2- PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA National Electrical Installation Standards.
- C. Do not fasten supports to pipes, ducts, mechanical equipment or conduit.
- D. Do not use spring steel clips and clamps.
- E. Obtain permission from A/E before using powder-actuated anchors.
- F. Obtain permission from A/E before drilling or cutting structural members.
- G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1" off wall.

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- J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- K. All items shall be supported from the structural portion of the building, except standard ceiling-mounted lighting fixtures, and small devices may be supported from ceiling system where permitted by Ceiling Contractor, however, no sagging of the ceiling will be permitted. Wire shall not be used as a support. Boxes and conduit shall not be supported or fastened to ceiling suspension wires or to ceiling channels.
- L. This Contractor shall lay out and install his work in advance of the laying of floors or walls, and shall furnish and install all sleeves that may be required for openings through floors, wall, etc. Where plans call for conduit to be run exposed, this Contractor shall furnish and install all inserts and clamps for the supporting of conduit. If this Contractor does not properly install all sleeves and inserts required, he will be required to do the necessary cutting and patching later at his own expense to the satisfaction of the Architect.
- M. All conduits shall be securely fastened in place per NEC. Hangers, supports or fastenings shall be provided at each elbow and at the end of each straight run terminating at a box or cabinet. The use of perforated iron for supporting conduits will not be permitted. The required strength of the supporting equipment and size and type of anchors shall be based on the combined weight of conduit, hanger and cables. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp-backs, or other accepted devices with suitable bolts, expansion shields (where needed) or beam-clamps for mounting to building structure or special brackets.
- N. Where two or more conduits are run parallel or in a similar direction, they shall be grouped together and supported by means of Kindorf type trapeze hanger system (racking) consisting of concrete inserts, threaded solid rods, washers, nuts and galvanized "L" angle iron, or Unistrut cross members. These conduits shall be individually fastened to the cross member of every other trapeze hanger with galvanized cast one hole straps, clamp backs, bolted with proper size cadmium machine bolts, washers and nuts. If adjustable trapeze hangers are used to support groups of parallel conduits, U-bolt type clamps shall be used at the end of a conduit run and at each elbow. J-bolts, or accepted clamps, shall be installed on each third intermediate trapeze hanger to fasten each conduit.
- O. Hanger assemblies shall be protected after fabrication by galvanizing. Hangers for PVC coated conduit shall be PVC coated galvanized conduit or stainless steel.
- P. On concrete or brick construction, insert anchors shall be installed with round head machine screws. In wood construction, round head screws shall be used. An electric or hand drill shall be used for drilling holes for all inserts in brick, concrete or similar construction. In brick, inserts shall be near center of brick, not near edge or in joint. Where steel members occur, same shall be drilled and tapped, and round head machine screws shall be used. All screws, bolts, washers, etc., used for supporting conduit or outlets shall be fabricated from rust-resisting metal, or accepted substitution. Fasteners similar to "TAP-CON" self tapping power driven type are acceptable. Plastic anchors are not acceptable.
- Q. Conduit supporting devices such as spring type conduit clips manufactured by Caddy Corporation may not be used.
- R. Threaded rod hangers shall be galvanized continuous thread type, minimum 3/8" diameter.
- S. Concrete/insert anchors, threaded rods, or similar fasteners installed on side or bottom of prestressed beams are not acceptable.

END OF SECTION



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SECTION 26 05 33 - CONDUIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for electrical conduit.
- B. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:
  - 1. Rigid Metal Conduit (RMC) NEC 344
  - 2. Flexible Metal Conduit (FMC) NEC 348
  - 3. Liquidtight Flexible Metal Conduit (LFMC) NEC 350
  - 4. Electrical Metallic Tubing (EMT) NEC 358
  - 5. Fittings and Conduit Bodies

1.3 REFERENCES

- A. ANSI C80.1 Electrical Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated
- C. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- D. ANSI/NFPA 70 National Electrical Code
- E. NECA Standard Practice of Good Workmanship in Electrical Contracting

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70. (See Drawings and this and other sections of these Specifications for additional requirements).
- B. Raceways and conduits shall begin at an acceptable enclosure and terminate only in another such enclosure except conduit/raceway stub-outs.
- C. A raceway shall be provided for all electrical power and lighting, and electrical systems unless specifically specified otherwise.

1.6 SUBMITTALS

- A. Submit catalog cut sheet showing brand of conduit to be used and showing that conduit is UL listed and labeled, and manufactured in the United States.
- B. Submit catalog cut sheet on all types of conduit bodies and fittings.
- C. Product data shall be submitted for acceptance on:
  - 1. Conduits.
  - 2. Conduit straps, hangers and fittings.
  - 3. Fitting entering and leaving the ground or pavement

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- D. Submit UL listed fire and smoke stopping assemblies for each applicable application.
- E. Product data shall prove compliance with Specifications, National Electrical Code, National Board of Fire Underwriters, manufacturers' specifications and written installation data.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit record documents to accurately record actual routing of conduits larger than 1.25".

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, properly store and protect products at the site.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from sun, rain, corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.9 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All conduits shall bear UL label or seal and shall be manufactured in the United States.
- B. Conduit systems and all related fittings, boxes, supports, and hangers must meet all the requirements of national, state, and other federal codes where applicable.

2.2 MINIMUM TRADE SIZE

- A. Rigid Conduit: 3/4".
- B. EMT: 3/4".
- C. Flexible and Seal-Tite Metallic Conduit: 1/2" C. (maximum 6' long).
- D. Homeruns and Branches Underground: 3/4" C.

2.3 RIGID METAL CONDUIT

- A. Comply with:
  - 1. ANSI C80.1.
  - 2. UL 6.
  - 3. NEC 344.
- B. Conduit material:
  - 1. Zinc coated or hot dipped galvanized steel.
- C. Fittings:
  - 1. Threaded.
  - 2. Insulated bushings shall be used on all rigid steel conduits terminating in panels, boxes, wire gutters, or cabinets, and shall be impact resistant plastic molded in an irregular shape at the top to provide smooth insulating surface at top and inner edge. Material in these bushings must not melt or support flame.
  - 3. Zinc plated or hot dipped galvanized malleable iron or steel.
- D. Conduit Bodies:
  - 1. Comply with ANSI/NEMA FB 1.
  - 2. Threaded hubs.
  - 3. Zinc plated or hot-dipped galvanized malleable iron.

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2.4 RIGID METAL CONDUIT PVC COATED

- A. Comply with:
  - 1. UL 6.
  - 2. ANSI C80.1.
  - 3. NEC 344.
  - 4. NEMA RN1.
- B. Conduit material: Hot-dipped galvanized rigid steel with external PVC coating, 40 mil thick.
- C. Fittings:
  - 1. Threaded.
  - 2. Insulated bushings on terminations.
  - 3. Zinc plated or hot-dipped galvanized malleable iron or steel with external PVC coating, 40 mil thick.
- D. Conduit Bodies:
  - 1. Comply With:
    - a) ANSI/NEMA FB 1.
    - b) Threaded hubs.
  - 2. Zinc plated or hot-dipped galvanized malleable iron with external PVC coating 40 mil thick.

2.5 FLEXIBLE METAL CONDUIT

- A. Comply With:
  - 1. NEC 348.
  - 2. ANSI/UL 1.
- B. Conduit Material:
  - 1. Steel, interlocked.
- C. Fittings:
  - 1. ANSI/NEMA FB 1.
  - 2. ANSI/UL 514B.
  - 3. Malleable iron, zinc plated.
  - 4. Threaded rigid and IMC conduit to flexible conduit coupling.
  - 5. Direct flexible conduit bearing set screw type not acceptable.

2.6 LIQUID-TIGHT FLEXIBLE METAL CONDUIT

- A. Comply with:
  - 1. NEC 350.
  - 2. ANSI/UL 360.
- B. Conduit material:
  - 1. Flexible hot-dipped galvanized steel core, interlocked.
  - 2. Continuous copper ground built into core up to 1-1/4" size.
  - 3. Extruded polyvinyl gray jacket.
- C. Fittings:
  - 1. Threaded for IMC/rigid conduit connections.
  - 2. Accepted for hazardous locations where so installed.
  - 3. Provide sealing washer in wet/damp locations.
  - 4. Compression type.
  - 5. ANSI/NEMA FB 1.
  - 6. ANSI/UL 514B.
  - 7. Zinc plated malleable iron or steel.

2.7 ELECTRICAL METALLIC TUBING

- A. Comply with:

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1. UL 797.
  2. ANSI C80.3.
  3. NEC 358.
  4. ANSI/UL 797.
- B. Conduit material: Galvanized steel tubing.
- C. Fittings:
1. ANSI/NEMA FB 1.
  2. Set screw.
  3. Zinc plated malleable iron or steel.
  4. Concrete tight.
- 2.8 RIGID POLYVINYL CHLORIDE CONDUIT
- A. Comply with:
1. NEMA TC 2.
  2. UL 651.
  3. NEC 352.
- B. Conduit material:
1. Shall be high impact PVC, tensile strength 55 PSI, flexural strength 11000 PSI.
- C. Fittings:
1. Comply with:
    - a) NEMA TC 3.
    - b) UL 514.
- D. General:
1. UL listed and identified.
  2. Conform to all national, state and local codes.
  3. Manufacturer shall have 5 years experience in manufacturing PVC conduits.
- 2.9 EXPANSION FITTINGS
- A. Expansion fittings shall be:
1. UL Listed, hot dipped galvanized inside and out side providing a 4" expansion chamber when used with rigid conduit, intermediate metal conduit and electrical metallic conduit, or:
  2. Be polyvinyl chloride and shall meet the requirements of and as specified elsewhere for non-metallic conduit and shall provide a 6" expansion chamber.
  3. Hot dipped galvanized expansion fitting shall be provided with an external braided grounding and bonding jumper with accepted clamps, UL listed for the application.
  4. Expansion fitting, UL listed for the application and in compliance with the NEC without the necessity of an external bonding jumper may be considered. Submit fitting with manufacturer's data and UL listing for acceptance prior to installation.

PART 3 - EXECUTION

3.1 LOCATION REQUIREMENTS

- A. Underground Installations:
1. Use rigid non-metallic conduit (PVC) only unless local Authority Having Jurisdiction or applicable codes/utility requirements, etc. require rigid steel conduit.
  2. Use galvanized rigid conduit, or PVC encased in steel-reinforced concrete.
  3. All conduits or elbows entering, or leaving the ground shall be rigid steel conduit coated with asphaltic paint.
  4. All underground raceways (with exception of raceways installed under floor slab) shall be installed in accordance with NEC 300.5 except the minimum cover for any conduit shall be

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- 2'. Included under this Section shall be the responsibility for verifying finished lines in areas where raceways will be installed underground before the grading is complete.
  5. Where rigid metallic conduit is installed underground as noted above it shall be coated with waterproofing black mastic before installation, and all joints shall be re-coated after installation.
  6. PVC runs over 150' in length shall utilize rigid steel 90 degree elbows at each riser and at each change in direction. Elbows shall be coated with black mastic or PVC coating. Bond all metal elbows per NEC 250.80 and NEC 300.5.
  7. All underground service lateral raceways shall be protected as required by NEC 300.5, including requirements for installation of warning tape.
- B. In Slab Above or on Grade:
1. Use coated rigid steel conduit, coated intermediate metal conduit (if accepted) or rigid non-metallic conduit.
  2. Coating of metallic conduit to be black asphaltic or PVC.
- C. Penetration of Slab:
1. Exposed Location:
    - a) Where penetrating a floor in an exposed location from underground or in slab, a black mastic coated or PVC coated galvanized rigid steel conduit shall be used.
  2. Concealed Location:
    - a) Where penetrating a floor in a location concealed in block wall and acceptable by applicable codes, rigid non-metallic conduit may be used up to first outlet box, provided outlet box is at a maximum height of 48" above finished floor.
    - b) Where penetrating a floor in location other than that above use a black mastic coated or PVC coated galvanized rigid steel conduit.
- D. Interior Dry Locations:
1. Concealed: Use rigid metal conduit, intermediate metal conduit, electrical metallic tubing. Rigid non-metallic conduit may be used inside block walls up to first outlet to a maximum of 40" AFF except where prohibited by the NEC (Places of Assembly, etc.).
  2. Exposed: Use rigid metal conduit or electrical metallic tubing. EMT may only be used where not subject to damage, which is interpreted by this specification to be above 90" AFF.
  3. Concealed or Exposed Flexible Conduit:
    - a) Concealed flexible steel conduit or seal tight flexible steel conduit in lengths not longer than 6' in length with a ground conductor installed in the conduit or an equipment ground conductor firmly attached to the terminating fitting at the extreme end of the flex. Exposed flexible steel conduit or seal tight flexible steel conduit shall not exceed 2' in length, unless written authorization by A/E for specific conditions is granted.
- E. Interior Wet and Damp Locations:
1. Use rigid galvanized steel or intermediate metal conduit.
- F. Concrete Columns or Poured in-place Concrete Wall Locations:
1. Use rigid non-metallic conduit. Penetration shall be by accepted metal raceway (i.e. metal conduit as required elsewhere in these specifications).
- 3.2 ADDITIONAL REQUIREMENTS FOR RIGID STEEL CONDUIT
- A. Rigid steel conduit shall be cut and threaded with tools accepted for the purpose and by qualified

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personnel.

1. Accepted pipe vise.
  2. Roller/bade type cutter or band saw.
  3. Reamer capable of completely removing all ridges or burrs left by the cutter. Reaming with pliers is not acceptable.
- B. Hangers shall be installed 8' apart.
- C. Conduits stubbed through floor slabs, above grade and not contained inside walls, shall be rigid galvanized metallic conduit.

3.3 ADDITIONAL REQUIREMENTS FOR EMT

- A. Electrical metallic tubing (thin wall) may be installed inside buildings above ground floor where not subject to mechanical injury.
- B. All cuts shall be reamed smooth and free of sharp and abrasive areas by use of an accepted reamer.

3.4 ADDITIONAL REQUIREMENTS FOR FLEXIBLE STEEL CONDUIT AND SEAL-TITE FLEXIBLE STEEL CONDUIT

- A. Shall be properly grounded.
- B. Shall be installed with accepted fittings.

3.5 ADDITIONAL REQUIREMENTS FOR RIGID NON-METALLIC CONDUIT (PVC CONDUIT)

- A. Rigid non-metallic PVC conduit is not allowed anywhere inside building(s) except underground, in slab, in poured in place concrete, and in block wall up to first outlet box (if not over 40" AFF) if allowed by codes. Rigid non-metallic PVC conduit may be used exterior to building as stated elsewhere in these specifications.
- B. Join rigid non-metallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- C. Threads will not be permitted on rigid non-metallic PVC conduit and fittings, except for rigid steel to rigid non-metallic PVC couplings.
- D. Installation of rigid non-metallic PVC conduit shall be in accordance with manufacturer's recommendations.
- E. Rigid non-metallic PVC conduit shall not be used to support fixture or equipment.
- F. Field bends shall be made with accepted hotbox. Heating with flame and hand held dryers are prohibited.

3.6 SUPPORTS

- A. Arrange supports to prevent misalignment during wiring installation.
- B. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- C. Group related conduits; support using conduit rack. Construct rack using steel channel; (minimum 24", increase distance as required) provide space on each for 25 percent additional conduits.
- D. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 Hangers and Supports.
- E. Do not support conduit with wire, metal banding material, or perforated pipe straps. Remove

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wire used for temporary supports

- F. Do not attach conduit to ceiling support wires.
- G. Conduits shall not be supported from ceiling grid supports, plumbing pipes, duct systems, heating or air conditioning pipes, or other building systems.
- H. Non-bolted conduit clamps, as manufactured Caddy Corp. are not accepted. Supporting conduit and boxes with wire is not accepted. All raceways except those from surface-mounted switches, outlet boxes or panels shall be supported with clamp fasteners with toggle bolt on hollow walls, and with lead expansion shields on masonry.

3.7 EXPANSION FITTINGS

- A. Provide expansion fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- B. Expansion fittings shall be installed in the following cases: In each conduit run wherever it crosses an expansion joint in the concrete structure; on one side of joint with its sliding sleeve end flush with joint, and with a length of bonding jumper in expansion equal to at least three times the normal width of joints; in each conduit run which mechanically attached to separate structures to relieve strain caused by shift on one structure in relation to the other; in straight conduit run above ground which is more than 100' long and interval between expansion fittings in such runs shall not be greater than 100'.

3.8 GROUNDING

- A. All raceways shall have a copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC codes.
- B. Grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings.
- C. Grounding conductors run with exterior/ underground feeders shall be bare only.
- D. Grounding conductors run with feeders shall be bonded to portions of conduit that are metal by accepted ground bushings.
- E. See other sections of these specifications for additional requirements.
- F. Grounding conductors (including lightning protection down conductors) run in metal conduit shall be bonded to metal conduit at both ends.

3.9 FIRE AND SMOKE STOPPING

- A. Contractor is to provide fire stopping and/or smoke stopping for all penetrations of existing (or new if applicable) fire or smoke barrier walls, chases, floors, etc. as required to maintain existing rating of floor, wall, chase, etc.
- B. Install conduit to preserve fire resistance rating of partitions and other elements.
- C. Install fireproofing material to maintain existing rating of floor, beams, etc. damaged or removed by renovation.
- D. Fire and smoke stopping material: A two-part silicone foam or a one-part putty, UL classified and FM accepted with flame spread of 0 and smoke development not to exceed 50 in compliance with ASTM E84. Material shall be suitable for penetration seals through fire-rated floors and walls when tested in compliance with ASTM E119. Material shall not melt or soften at high temperatures, shall be suitable for direct outdoor and ultraviolet exposures, shall cure to give a tight compression fit, and shall not produce toxic fumes. Material, when heated, shall expand to fill and hold penetration closed where burn out of cable insulation or ATC tubing occurs.

3.10 GENERAL

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- A. Install conduit in accordance with NECA Standard Practice of Good Workmanship in Electrical Contracting. Contractor shall layout all work prior to rough-in.
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange conduit to maintain headroom and present neat appearance.
- D. Route conduit installed above accessible ceilings or exposed to view parallel or perpendicular to walls. Do not run from point to point.
- E. Route conduit in and under slab from point-to-point.
- F. Do not cross conduits in slab.
- G. Maintain adequate clearance between conduit and piping.
- H. Maintain 12" clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- I. Cut conduit square using saw or pipecutter; de-burr cut ends.
- J. Bring conduit to shoulder of fittings; fasten securely.
- K. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- L. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2" size.
- M. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- N. Provide and install pullboxes, junction boxes, fire barrier at fire rated walls etc., as required by NEC 300, whether shown on Drawings or not.
- O. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- P. Ground and bond conduit under provisions of Section 26 05 26 Grounding and Bonding.
- Q. Identify conduit under provisions of Section 26 05 53 Identification for Electrical Systems.
- R. Install all conduits concealed from view unless specifically shown otherwise on drawings
- S. Rigid steel box connections shall be made with double locknuts and bushings.
- T. All raceways shall be kept clear of plumbing fixtures to facilitate future repair or replacement of said fixtures without disturbing wiring. Except where it is necessary for control purposes, all raceways shall be kept away from items producing heat.
- U. All raceway runs in masonry shall be installed at the same time as the masonry so that no face cutting is required, except to accommodate boxes.
- V. All raceways shall be run from outlet to outlet as shown on the drawings, unless permission is granted to alter arrangement shown. If permission is granted arrangement shall be marked on field set of drawings as previously specified.
- W. Spare conduit stubs shall be capped and location and use marked with concrete marker set flush with finish grade. Marker shall be 6" round x 6" deep with appropriate symbol embedded into top to indicate use. Also, tag conduits in panels where originating.
- X. All conduit stubbed above floor shall be strapped to Kindorf channel supported by conduit driven into ground or tied to steel. Spare conduit stubs shall be capped with a UL listed and accepted cap or plug for the specific intended use and identified with ink markers as to source and labeled "Spare."
- Y. All connections to motors or other vibrating equipment including transformers or at other



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locations where required shall be made with not less than 12" of flexible liquid-tight steel conduit, with nylon insulated throat connectors and wire mesh grip fittings (manufactured by Thomas & Betts or accepted equal) at both terminations of conduit. Use angle connectors wherever necessary to relieve angle strain on flex conduit.

- Z. Provide conduit seal-offs wherever conduit crosses obvious temperature changes (i.e. from inside to outside of coolers, freezers, etc.).
- AA. Route conduit through roof openings for piping and ductwork or through suitable roof flashing or boot. Coordinate location with roofing installation specified under other Sections of these specifications.
- BB. All raceways shall be run in neat and workmanlike manner and shall be properly in accordance with latest edition of NEC with accepted conduit clamps, hanger rods and structural fasteners.
- CC. All raceway runs, whether terminated in boxes or not, shall be capped during the course of construction and until wires are pulled in, and covers are in place. No conductors shall be pulled into raceways until construction work which might damage the raceways has been completed.
- DD. Electrical raceways shall be supported independently of all other systems and supports, and shall in every case avoid proximity to other systems which might cause confusion with such systems or might provide a chance of electrolytic actions, contact with live parts or excessive induced heat.

END OF SECTION

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SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install all equipment, labor and material for a complete identification system including but not limited to:
  - 1. Nameplates and labels.
  - 2. Wire and cable markers.
  - 3. Conduit markers.
- B. Identify all new and existing conduit, boxes, equipment, etc. as specified herein.

1.3 REFERENCES

- A. ANSI/NFPA 70 National Electrical Code
- B. Americans with Disabilities Act

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

PART 2- PRODUCTS

2.1 NAMEPLATES

- A. Nameplates shall be laminated phenolic plastic, chamfered edges.
  - 1. 120/208 Volt System:
    - a) Black front and back, white core, lettering etched through outer covering, white engraved letters on black background.
  - 2. 277/480 Volt System:
    - a) Orange with white letters.
  - 3. Emergency System:
    - a) Red with white letters.
  - 4. Emergency Power:
    - a) Red front and back, white core, lettering etched through outer covering, white engraved letters on red background.
- B. Letter Size:
  - 1. 1/8" letters for identifying individual equipment and loads.
  - 2. 1/4" letters for identifying grouped equipment and loads.
- C. Nameplates shall adequately describe the function of the particular equipment involved. Where nameplates are detailed on the Drawings, inscription and size of letters shall be as shown and shop drawing submitted for acceptance. Nameplates for panelboards, switchboards, motor

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control centers, disconnects and enclosed breakers shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 120/208V, 3-phase, 4-wire." In addition, provide phenolic label in panel to describe where the panel is fed from and location. For example, "Fed From MDP-1:3:5 Electrical Room #E101 Level 1." Nameplates for equipment listed below shall describe particular equipment name and associated panel/circuit, if applicable. The name of the machine on the nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and pushbutton station nameplates for that machine.

- D. The following items shall be equipped with nameplates:
1. All motors, motor starters, motor-control centers, pushbutton stations, control panels, time switches, disconnect switches, transformers, panelboards, circuit breakers (i.e., all 2-pole, 3-pole circuit breakers), contactors or relays in separate enclosures, power receptacles where the nominal voltage between any pair of contacts is greater than 150V, wall switches controlling outlets that are not located within sight of the controlling switch, high voltage boxes and cabinets, large electrical, and electrical systems (Systems Divisions 27, 28), junction and pull boxes (larger than 4-11/16"), terminal cabinets, terminal boards, and equipment racks. Nameplates shall also describe the associated panel and circuit number, if applicable.
  - E. All Electrical system panels, transfer switches, motor control centers, disconnect switches, motor controllers, etc. shall be labeled as per branch, i.e.: "Panel ABC Emergency-Life Safety Branch" (similar for emergency legally required standby branch, or emergency optional standby branch).

## 2.2 WIRE MARKERS

- A. Description: Cloth, tape, split sleeve or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
- C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings including neutral conductor.
  2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on shop drawings.

## 2.3 CONDUIT/JUNCTION BOX COLOR CODE

- A. All conduit system junction boxes (except those subject to view in public areas) shall be color coded as listed below:

<u>COLOR CODE FOR JUNCTION BOXES</u>	<u>KRYLON PAINT NUMBER</u>
System Emergency 277/480 volt	Cherry Red K02101
System Emergency 120/208 volt	Zinger Pink S01150
Fire Alarm	Safety Orange K02410
Normal Power 277/480 volt	Leather Brown K02501
Normal Power 120/208 volt	Glossy Black K01601
Telephone	Safety Green K02012
Grounding	Fluorescent Green K03106

- B. Conduit (not subject to public view) longer than 20' shall be painted with above color paint band 20' on center. Paint band shall be 4" in length applied around entire conduit. Where conduits are parallel and on conduit racking, the paint bands shall be evenly aligned. Paint shall be neatly applied and uniform. Paint boxes and raceways prior to installation, or tape conduits and surrounding surfaces to avoid overspray. Paint overspray shall be removed.
- C. Junction boxes and conduits located in public areas (i.e. areas that can be seen by the public)

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shall be painted to match surface attached to. Provide written request to A/E for interpretation of public areas in question.

2.4 CONDUIT/JUNCTION BOX MARKER

- A. All new and existing junction boxes/cover plates for power, lighting and systems (except those installed in public areas) shall adequately describe its associated panel and circuit reference number(s) within (i.e. ELRW-2, 4, 6), or systems within (i.e. fire alarm, intercom, etc.). Identification shall be neatly written by means of black permanent marker. Paint one-half of cover plate with appropriate color above, and one-half with associated panel/circuit or system as described above. Junction box cover plates located in public areas shall be identified with small phenolic labels securely attached. Label colors to be determined by A/E. Large pull/junction boxes (8" x 8" or larger) shall be color identified by painting the corners of box cover plate with specified colors at 45 degree angles; phenolic labels as specified herein.
- B. Identify conduit not installed in public areas with corresponding panel/circuit numbers or corresponding system type as described above. Spacing 20 ft. on center adjacent to color identification bands.

PART 3- EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel pop rivets.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Nameplates installed inside on dead front cover shall be self-adhesive tape. Do not drill or install screws in dead front.
- E. Identify new and existing conduit, junction boxes, and outlet boxes using field painting.
- F. Identify new underground conduit using underground warning tape. Install a minimum of one tape per trench at 6" below finished grade. For trenches exceeding 24" in width, provide one tape per 24" of trench width spaced evenly over trench width.
- G. Install wire markers at all new connections and terminations, and at existing connections and terminations modified or altered.

END OF SECTION

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SECTION 26 08 13 - TESTS AND PERFORMANCE VERIFICATION OF ELECTRICAL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section pertains to the furnishing of all labor, materials, equipment and services necessary to test and prove performance of the electrical system.
- B. Operate system for a three day period. Do performance verification work as required to show that the system is operating correctly in accordance with design. Supply instruments required to read data. Adjust system to operate at the required performance levels.

PART 2 - PRODUCTS (Not Applicable)

PART 3- EXECUTION

3.1 TESTS

- A. System:
  - 1. General: After installation of all conductors and before final acceptance, make required tests to determine proper functioning of all circuits. Furnish all necessary instruments required to make tests and correct any deficiencies found. Prior to energizing, circuits shall be "rung-out" to verify opens, intentional and non-intentional grounds, continuity and detect short circuits by accepted constant megger.
  - 2. Procedure:
    - a) All wires in conduit that are shorted or unintentionally grounded shall be replaced.
    - b) Insulation resistance of all feeder conductors and all conductors AWG #1 and larger shall be tested. This is to include all new conductors and/or all existing conductors that are connected and/or extended. Each conductor shall have its insulation resistance tested after the installation is completed and all splices, taps, and connections are made, except connection to source and point of final termination at distribution or utilization equipment.
    - c) Insulation resistance of conductors that are to operate at 600 volts or less shall be tested by using AVO Biddle (or accepted equal) megger at not less than 1000 volts dc. Resistance shall be measured from conductor to conduit (ground). Testing methodology shall conform to short-time or spot-reading procedural recommendations of AVO Biddle Instruments for specific megger being used. Acceptable insulation resistance of conductors rated at 600 volts shall not be less than 1 megohm.
    - d) Conductors that do not satisfy test requirements of paragraph c) above, shall be removed, replaced, and testing repeated on new cable at no additional cost to the Owner. All tests shall be performed by licensed electrician trained in the use of test instruments. Contractor shall furnish all instruments and personnel required for tests, shall tabulate readings observed and complete Conductor Insulation Resistance Test form (see Section 26 01 00 Operation and Maintenance Manuals) and submit five copies to Engineer for acceptance. Test shall be witnessed by Owner's Representative and Engineer (if so desired). Final acceptance data is to be submitted in O & M Manual.
    - e) Test reports shall identify each feeder conductor tested, date, time and result of

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test, weather conditions and range, test voltage, and serial number of the megger instrument used. Any conductor or splice that is found defective shall be promptly removed and replaced, and additional test shall be performed.

- f) Observe all safety instructions set by testing equipment manufacturer. Application of voltage testing involves risk of electric shock and sparking.

B. Motors:

1. Test run each motor via motor's control unit in both manual mode and automatic mode. Verify proper operation, voltage and rotation.
2. Test run each motor furnished under this Division of the Specifications and all existing motors specifically noted on the Drawings and/or Specifications to be tested:
  - a) With the system energized, line-to-line voltage and line current measurements shall be made at the motors under full load conditions. Should measured values deviate +/- 10% from the nameplate ratings, the condition shall be corrected. Notify the Engineer immediately should deviations occur.
  - b) Record results of existing motors tested and submit values to A/E in writing.
  - c) Test the insulation resistances of all motor windings to ground with a megger before applying line voltage to the motors. If these values are less than 1 megohm, the Contractor furnishing the motor shall be responsible for correcting the error.
  - d) Determine power factor of motor(s) at full load.
  - e) Tabulate readings, complete Motor Test Information form (see Section 26 01 00 Operation and Maintenance Manuals) and submit five copies to the Engineer for acceptance. Final accepted data is to be submitted in O & M Manual.

C. Grounds:

1. Test each raceway for raceway continuity as called for in Section 26 05 26 Grounding and Bonding.
2. Test each grounding system used in the project as called for in Section 26 05 26 Grounding and Bonding.
3. Grounding resistance shall be as called for in Section 26 05 26 Grounding and Bonding.

D. Communications:

1. See specific sections of these Specifications for further requirements.

E. Ground Fault System:

1. The ground fault protection system shall be performance tested when first installed on site. The test shall be conducted in accordance with instructions that shall be provided with the equipment. A written record of this test shall be made and shall be provided to the Authority Having Jurisdiction and to the Engineer of Record.

END OF SECTION

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SECTION 26 27 16 - CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:
  - 1. Hinged cover enclosures.
  - 2. Cabinets.
- B. Cabinets and enclosures are to include:
  - 1. Terminal blocks,
  - 2. Mounting panel,
  - 3. Ground bus/bar, and
  - 4. All accessories as required for a complete and operating system.
- C. Provide and install cabinets and enclosures as specified herein for all systems specified in Divisions 26, 27, 28 when included with these Specifications.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

- A. Conform to the requirements of the following:
  - 1. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)
  - 2. NEMA ICS 4 Terminal Blocks
  - 3. ANSI/NFPA 70 National Electrical Code
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.4 SUBMITTALS

- A. Submit Product Data: Provide manufacturer's standard data for enclosures and cabinets.
- B. Submit Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under "References and Regulatory Requirements." Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- C. Submit actual shop drawings on all cabinets and enclosures showing:
  - 1. Covers.
  - 2. Dimensions - inside and out.
  - 3. Gauge of metal.
  - 4. Manufacturer.
  - 5. Terminal mounting plate, construction, etc.
  - 6. Ground bus/bar.

1.5 EXTRA MATERIALS

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- A. Provide two of each cabinet key.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Unless specifically called for otherwise on Contract Drawings, provide cabinets as specified herein for terminal cabinets mounted indoors. Similarly, provide hinged cover enclosures as specified herein for terminal cabinets mounted outdoors or in locations other than NEMA 1 locations. Also provide hinged cover enclosures for locations where size required is not available in cabinet construction, or if specifically specified as enclosure in Contract Documents.
- B. Size:
1. Dimensions of cabinets and enclosures shall meet the dimensions shown on Drawings, dimensions required by NEC, or dimensions sized as required to facilitate all equipment/connections involved installation, whichever is largest.
  2. Coordinate with Division 27 Sections of these Specifications to ensure size of equipment cabinet or enclosure will house and facilitate proper installation and access to equipment, to be installed/mounted in cabinet or enclosure.
- C. Provide metal barriers to separate compartments containing control wiring operating at less than 50 volts from power wiring.
- D. Provide accessory feet and/or mounting brackets for free-standing equipment.
- E. Cabinets and enclosures installed outdoors shall be fully weatherproof and watertight.

2.2 HINGED COVER ENCLOSURES

- A. Construction:
1. Interior Locations: NEMA Type 1 steel (unless otherwise noted).
  2. Exterior Locations: NEMA Type 4X:
    - a) Within 10 miles of ocean or gulf: stainless steel or fiberglass.
    - b) Other exterior locations: primed and phosphatized steel.
- B. Covers: Continuous hinge.
- C. Enclosure Finish:
1. NEMA 1: manufacturer's standard metallic gray enamel over phosphatized surfaces.
  2. NEMA 4X:
    - a) Within 10 miles of ocean or gulf: stainless steel or gray gel coat on fiberglass.
    - b) Other exterior locations: epoxy painted.
- D. Lock/Handle:
1. Provide/install key lock handle on all enclosures mounted in rooms/areas/spaces that are not electrical rooms or mechanical rooms. Enclosures installed in electrical rooms need not be and are not required to be lockable.
- E. Interior Mounting Plate:
1. Each enclosure is to have interior mounting plate/panel for mounting terminal blocks and electrical components.
  2. Plate/panel is to be metal.
- F. Ground Bus/Bar:



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1. Each enclosure housing surge protective devices or other equipment shall have local ground bar/bus installed. See "Local Ground Bus/Bar" included with this Section.

G. Manufacturers:

1. Hoffman.
2. Electromate Corporation.
3. Carlon for NEMA 4X.

2.3 CABINETS

A. Construction: Code gauge steel with removable endwalls.

B. Finish:

1. Boxes: galvanized steel.
2. Fronts: gray baked enamel.

C. Fronts:

1. Electrical or Mechanical Room Locations: Screw cover with flush handle or as noted below.
2. Other Locations: Mono-flat with concealed trim clamps, concealed hinges, and flush lock lockable handle.
3. Flush or surface type as shown or called for in Contract Documents.

D. Interior Mounting Plate:

1. Each enclosure is to have interior mounting plate/panel for mounting terminal blocks and electrical components.
2. Panel/plate may be constructed of wood if painted with fire retardant paint of a flame spread rating of Class A, if it meets all applicable codes, and it is acceptable to the Authority Having Jurisdiction, otherwise plate to be metal.
3. Panel/plate shall be metal.

E. Ground Bus/Bar:

1. Each cabinet housing surge suppression equipment or other equipment shall have local ground bar/bus installed. See "Local Ground Bus/Bar" included within this Section.

F. Manufacturer:

1. Sq. "D" Class 6650 Series.

2.4 TERMINAL BLOCKS

A. Terminal Blocks: ANSI/NEMA ICS 4.

B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors rated 600 volts.

C. Signal and Control Terminals: Modular construction type suitable for channel mounting with tubular pressure screw connectors rated 300 volts.

D. Provide ground bus terminal block with each connector bonded to enclosure.

2.5 LOCAL GROUND BUS/BAR

A. Size to handle #6 through #14 AWG copper ground wire.

B. Length as required for circuits.

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C. Manufacturer:

1. Sq. "D" #PK\*\*\*GTA Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.

3.2 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install enclosures and cabinets plumb. Anchor securely to wall and structural supports at each corner.
- C. Install cabinet fronts plumb.
- D. Install per NEC and as required for proper clearance. Coordinate with panels.
- E. Provide and install terminal cabinets as shown on Drawings or as required by the NEC.
- F. Provide and install terminal cabinets wherever required for a complete and operating distribution system whether shown on Drawings or not.
- G. Install local ground bus/bar in each terminal cabinet/enclosure that houses surge protective devices or other equipment and bond to cabinet enclosure via mounting screws or #6 AWG copper ground wire.
- H. Ground local ground bus to systems ground bus/bar with minimum #6 AWG copper ground wire. Increase size if so required on drawings.
- I. Install enclosures.

END OF SECTION

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SECTION 26 27 26 - WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:
  - 1. Wall switches.
  - 2. Receptacles.
  - 3. Device plates and decorative box covers.

1.3 REFERENCES

- A. NEMA WD 1 General Requirements for Wiring Devices
- B. NEMA WD 6 Wiring Devices Dimensional Specifications

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

- A. Submit Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
  - 1. Submit product data on all types of wiring devices including plates and engraving.
- B. Submit Manufacturer's Instructions:
  - 1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
  - 2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years experience.

1.7 EXTRA MATERIALS

- A. Provide a minimum of two screwdrivers of each type of tamper proof screw used on project.
- B. Turn over to Owner and submit Spare Parts/Maintenance Stock Certification. (See Section 26 01 00 Operation and Maintenance Manual).

PART 2 - PRODUCTS

2.1 GENERAL

- A. All devices shall be Specification Grade as minimum.
- B. General purpose wiring devices shall meet NEMA standard WD-1, Wiring Devices, General Purpose. Special purpose devices shall conform to the requirements of NEMA standard WD-5,

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Wiring Devices, Special Purpose.

- C. All wiring devices shall bear UL labels.
- D. All devices of one type (i.e. all snap switches, all duplex receptacles, etc.) shall be by the same manufacturer. Hazardous Location and Special Purpose Devices may not be available from the same manufacturer; this shall constitute the only exception to this requirement of single-source.
- E. Corrosion resistant devices shall be as specified for normal usage, and fabricated of yellow color melamine plastic. Where "Weatherproof" type is indicated for exterior or wet locations, provide matching self-closing cover with gasketed seals at plate/wall junctions and for cover.
- F. Provide factory packaged wiring devices having high impact strength molded plastic bodies.
- G. Except where specifically required in these Specifications, use of interchangeable type or combination switch-receptacle-pilot devices is not acceptable and shall be removed.
- H. Switches and receptacles connected to emergency power system shall be red. Plates shall be as specified for devices connected to normal circuits, but shall be engraved reading "Emergency", see Drawings for other engraving requirements.

## 2.2 WALL SWITCHES

A. Manufacturers:

- 1. See Drawings.

B. General:

- 1. Snap switches for general use shall be maintained contact types, and shall be single-pole, double-pole, three-way, or four-way as required for the specific switching arrangements shown on the drawings. They shall be quiet tumbler operation types, having silver alloy contacts, and meeting all NEMA performance standards. Color to match plates unless specifically noted otherwise in Specifications and/or on Drawings.
- 2. Switches shall be toggle or key-operated types, as indicated on the Drawings. All key-operated switches shall be keyed alike.
- 3. Where switches are denoted as having pilot lights, pilot lights shall glow when the switches are "On". Provide pilot light switch with lamp and miniature step-down transformer. The pilot light shall have a red lens, and the lamp shall be long-life type.
- 4. Jewels for use with switches controlling motors shall be green, and jewels for other purposes shall be amber. All units shall be front relampable.
- 5. Snap switches installed in hazardous locations shall be UL listed for the type of location (class and division).
- 6. Switches connected to [the life safety or critical branch of the emergency distribution system] emergency power shall have red lighted handles which shall illuminate when the switches are Off.
- 7. Voltage and ampere rating of switches shall be marked on switch, and shall conform to voltage of system to which applied.

C. Description: NEMA WD 1, heavy-duty, ac only general-use snap switch.

D. Voltage Rating: 120-277 volts, ac.

E. Current Rating: 20 amperes minimum.

F. Ratings: Match branch circuit and load characteristics.

## 2.3 RECEPTACLES

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A. General:

1. All receptacles shall be of standard NEMA configuration, as indicated on the Drawings, and shall comply with the respective ANSI C73 series standard for the NEMA configuration. Color to match plates unless specifically noted otherwise in specifications and/or on drawings.
2. Duplex receptacles shall have integral UL listed self-grounding clips. Similar, single receptacles shall be provided for plug-in connections of Industrial Fluorescent light fixtures on the same switching circuit. Receptacle face to be impact resistant nylon.
3. Weatherproof duplex receptacles shall be provided in all exterior locations, and shall be ground fault circuit interrupting (GFCI) types, with weatherproof cover plates allowing use of receptacle with cover in closed position.
4. Special purpose receptacles for specific equipment shall be grounding types, having the number of poles, voltage and ampere ratings, and NEMA configurations required by the equipment. For each special purpose receptacle, provide an identical mating plug equipped with cord grip, secured to cord.
5. Duplex receptacles shall have back and side wired screw pressure terminals.

B. Description: NEMA WD 1; heavy-duty general use receptacle.

C. Configuration: NEMA WD 6; heavy-duty, general use type as specified and indicated.

D. Convenience Receptacle: Type 5-20.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

F. Manufacturers:

1. See Drawings.

2.4 COVER PLATES

A. All wiring devices shall be provided with standard size one-piece cover plates of suitable configuration for the number and type of devices to be covered.

B. Metallic cover plates shall be used in interior spaces, except as noted below, and shall be fabricated of corrosion-resistant #302 stainless steel having a nominal thickness of .04" and a brushed finish. Screws securing the plates shall have flush (when installed) heads with finish to match plates. Metallic cover plates shall meet all requirements of the National Electrical Code and Federal Specifications.

C. Cover plates for exterior receptacles shall be gasketed covers with hinge allowing plug and cord to be plugged in and activated with cover closed..

D. Cover plate engraving, where required, shall be accomplished by cover plate manufacturer in accordance with instructions given on the Drawings. Metallic plates and nylon plates in ivory, beige, gray, and white shall be engraved with black fill. Red, brown, and black nylon plates shall be engraved with white fill.

2.5 COLOR

A. Wiring devices connected to normal power and located in unfinished spaces shall be grey color. Devices connected to normal power and located in finished interior spaces shall be of color selected by Architect from the following list of standard colors: ivory, beige, gray, white, brown, black.

B. Cover plates for devices connected to normal power and located in finished interior spaces shall be of color selected by Architect from the above list of standard colors or #302 stainless steel.

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- C. All devices and coverplates in paneled walls shall have finish to match paneling.
- D. Devices connected to the life safety or critical branch of the emergency distribution system] emergency power shall be red color, except where established building standards and/or isolated ground devices require otherwise. Coordinate before purchase.
- E. Contractor shall modify any given catalog numbers as required to procure devices and plates of the proper color.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Verify conditions under provisions of Division 01 General Requirements and any other applicable supplemental requirements/conditions.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify floor boxes are adjusted properly.
- E. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- F. Electrical boxes shall be cleaned and completely free of any debris, dust, etc. prior to the installation of wiring devices.
- G. Where two or more switches or receptacles are to be installed adjacent to one another, provide a multi-gang box and combination multi-gang coverplate. Provide proper NEC barriers in boxes which serve devices for both the Normal and Emergency Systems.
- H. Provide device coverplates for every device installed. Cover plates shall be installed so that they appear straight with no gaps between plate edges and the wall. Maintain vertical and horizontal to within 1/16 of an inch.
- I. In finished areas provide same type of plate for all surface mounted devices as for recessed mounted devices.
- J. In any room where new and existing construction is present, all receptacles, switches, and coverplates which are existing to remain shall be changed as required to match new work.
- K. Wiring devices shall not be installed in exposed masonry until cleaning of masonry with acids has been completed.
- L. All receptacles and switches shall be grounded by means of a ground wire from device ground screw to outlet box screw and branch circuit ground conductor. Strap alone will not constitute an acceptable ground.

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- M. All wiring devices, relays, contactors, pushbuttons, selector switches, pilot lights, etc. shall be installed in approved enclosures rated for the appropriate NEMA classified environment.
- N. All devices shall be installed so that only one wire is connected to each terminal.
- O. Once construction is substantially completed, replace all damaged, burned, or scorched wiring devices.
- P. Receptacles shown to be floor mounted shall be installed in floor boxes (with coverplates) which are approved for this use.
- Q. Connect wiring devices by wrapping conductor around screw terminal.
- R. Install protective rings and split nozzle on active flush cover service fittings.
- S. Install local room area wall switches at door locations on the lock side of the door approximately 4" from the jamb. Where locations shown on the Drawings are in question, provide written request for information to A/E prior to rough-in.

3.4 NEUTRAL CONDUCTOR CONNECTIONS

- A. Each receptacle's "in" and "out" phase and neutral conductors shall have an additional conductor for connection to device. The practice of "looping" conductors through receptacle boxes shall not be acceptable.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under other Sections of these Specifications to obtain mounting heights specified and indicated on Drawings.

3.6 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

END OF SECTION

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SECTION 26 28 19 - ENCLOSED DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Provide all labor, materials, and equipment necessary to properly install switches as shown on the Drawings and as required by codes.
- B. Provide all disconnect switches.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver switches in factory wrapped packaging to the site. Handle switches carefully to prevent damage. Store in a clean, dry space protected from dirt, water, and physical damage. Do not install damaged switches.

1.4 QUALITY ASSURANCE

- A. The manufacturer of switches shall be the same as that of the panelboards.

1.5 SUBMITTALS

- A. Submit catalog cut sheet on each type of disconnect switch to be used on this project. Submit catalog cut sheet on enclosure locks to be used on this project.

PART 2 - PRODUCTS

2.1 CONSTRUCTION

- A. Switches shall be heavy duty types with visible, quick-make, quick-break blades.
- B. Units for 2-speed motors shall be 6-pole in a single enclosure. Use of two 3-pole units will not be acceptable.
- C. Provide ground bus, and where required a solid neutral bus.
- D. Switches shall be fusible or nonfusible as denoted on the Drawings or as required by the equipment served from the switch. Fusible switches shall have rejection type fuse holders.
- E. Terminal lugs shall be rated for 75 degrees Centigrade.
- F. Enclosures, unless otherwise noted, shall be NEMA 1 for indoor locations and NEMA 4X stainless steel for outdoor locations as a minimum. Krydon or fiberglass material may be used in a NEMA 4X application. All switches mounted outdoors including those noted to be NEMA 3R on drawings shall be heavy duty type 4X, watertight, corrosion resistant. In lieu of NEMA 4X, Contractor may provide NEMA 3R disconnects if all surfaces of enclosure are coated with epoxy paint that will not scratch off.
- G. The enclosure shall be interlocked with the switch handle such that the enclosure door or cover cannot be opened with the switch in the "ON" position. The switch handle shall be capable of being padlocked in the "OFF" position but not in the "ON" position.
- H. Finish for NEMA I units shall be standard baked gray enamel finish over a rust inhibiting phosphate primer.
- I. Each disconnect switch shall be provided with a Homac #ELB-2 or similar enclosure lock. Homac #ELB-2 is available from Graybar Electric.
- J. Disconnect switches installed between any variable speed drive type of unit (VFD, AFD, USD,



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etc.) and its respective motor(s), shall have auxiliary break before break (open) interlock control contact.

- K. Disconnect switches installed to disconnect HVAC equipment are to be fusible type with fuses as recommended by HVAC manufacturer.

## 2.2 RATING

- A. The size, number of poles, and fusing for each switch shall be as denoted on the Drawings. As a minimum, no less than one pole for each ungrounded conductor shall be provided. Switches shall be rated 250 VAC or 600 VAC as required by the circuit to which it is connected.
- B. Switches serving motors with more than one set of windings shall have the number of poles necessary to disconnect all conductors to all windings in a single switch. Switches serving motor loads shall be horsepower rated of sufficient size to handle the load.

## 2.3 KITCHEN EQUIPMENT

- A. All switches in kitchen areas, wet areas, etc. to be NEMA 4 stainless steel.

## 2.4 ENCLOSED CIRCUIT BREAKERS

- A. Molded Case Circuit Breakers: NEMA AB1, plug-on type for 250V or less, bolt-on type for over 250V, thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Breakers shall be HID rated. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
- B. Thermal-magnetic, molded case, with inverse time-current overload and instantaneous magnetic tripping, unless otherwise shown. Breakers shall be calibrated for 40 degrees C or shall be ambient compensating.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install all switches in accordance with the manufacturer's written instructions, NECA National Electrical Installation Standards, the applicable requirements of the NEC, and recognized industry practice.
- B. All switches shall be firmly anchored to walls and supporting structures (where used) using appropriate installation. Switches shall be installed with the turning axis of their handles approximately 5'-0" above finished floor unless otherwise indicated. Provide rigid steel (galvanized for exterior use) mounting stands, brackets, plates, hardware, and accessories for a complete installation.
- C. Switches shall be mounted in accessible locations chosen where the passageway to the switch is not likely to become obstructed. Where a switch serves as the disconnecting means for a load, the switch shall be located as close as practical to the load with the switch handle within sight of the load.
- D. Provide and install lugs on disconnect switch as required to accept conductors called for on Drawings.
- E. Disconnect switches shall not be mounted on equipment unless specifically noted or required, and meet all applicable codes, etc. If switches are noted or required to be mounted on equipment, they shall have vibrator clips on fuses and be connected to conduit system with liquid tight flexible conduit.
- F. Provide and install enclosure lock on each disconnect switch. Enclosure lock bolt shall be tightened firmly but not tight enough to break bolt.

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- G. Coordinate all requirements for controls between variable speed drive unit and its respective motor with drive specification, manufacturer, provider and installer. Provide auxiliary contacts, relays, etc. as required.

END OF SECTION

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SECTION 26 51 13 - INTERIOR LIGHTING FIXTURES, LAMPS AND BALLASTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
  - 1. Interior luminaires and accessories
  - 2. Ballasts
  - 3. Lamps
  - 4. Luminaire accessories
- B. Light fixtures furnished under this Division shall be furnished complete with lamps and all necessary trim and mounting hardware, and installed as shown on the Drawings.
- C. Light fixtures shall be neatly and firmly mounted, using standard supports for outlets and fixtures.
- D. Lamps shall be included in the system guarantee for a period of thirty days after final acceptance of the building.

1.3 REFERENCES

- A. ANSI C78.379 Classification of the Beam Patterns of Reflector Lamps
- B. ANSI C82.1 Lamp Ballast – Line Frequency Fluorescent Lamp Ballast
- C. ANSI C82.4 Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type)
- D. ANSI/NFPA 70 National Electrical Code
- E. ANSI/NFPA 101 Life Safety Code
- F. NEMA WD 6 Wiring Devices - Dimensional Requirements

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of
  - 1. ANSI/NFPA 70
  - 2. NFPA 101
  - 3. ADA
  - 4. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

- A. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
  - 1. Shop drawings shall be submitted for all fixtures that require modifications, either as specified or as required to fit architectural field conditions of this project. (i.e., luminous ceiling, wall/slot fixtures, special fixtures).
  - 2. Shop drawings shall be complete showing all dimensions and installation instructions required for conditions on this project.

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- B. Submit Product Data: Provide dimensions, ratings, and performance data. Product data shall be submitted for all light fixtures showing:
  - 1. Dimensions
  - 2. UL Label
  - 3. Fusing
  - 4. Luminaire Disconnect
  - 5. Metal gauge
  - 6. Lens/louvre thickness
  - 7. Finish
  - 8. Voltage
  - 9. Lamps

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit Maintenance Data and include replacement parts list.

1.7 MANUFACTURER'S QUALIFICATIONS

- A. Company specializing in manufacturing products specified in this Section with minimum five years experience.

1.8 PRODUCT STORAGE AND HANDLING

- A. Physically protect fixtures against damage as recommended by manufacturer.

1.9 MAINTENANCE MATERIALS

- A. Provide to Owner:
  - 1. Ten of each size/type of fuses.

1.10 WARRANTY

- A. All ballasts furnished under this Division shall be covered by a warranty against defects. Warranty shall include payment for normal labor costs of replacement of inoperative in-warranty ballasts.

PART 2 - PRODUCTS

2.1 LUMINAIRES/FIXTURES

- A. Furnish products as specified in schedule on Drawings.
- B. Install ballasts, lamps, and specified accessories at factory.
- C. All light fixtures shall adhere to UL Test Standard 1598 and NEC 410.115(C). All manufacturers shall provide the required thermal protection as required.

2.2 LAMPS

- A. Manufacturers
  - 1. Sylvania, G.E., Phillips.
- B. Incandescent:
  - 1. Lamps to be rated and stamped for 130 volts.
  - 2. Provide type specified for luminaire/fixture on drawings.
  - 3. Reflector lamp beam patterns: ANSI C78.379.

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C. Fluorescent:

1. Fluorescent lamps to be Octron type T8 bulb with medium bi-pin base.
2. Correlated color temperature shall be 4100K with color rendering index of 80.

2.3 BALLASTS

A. Manufacturers:

1. Magnetek, Advance, or accepted substitution.

B. Fluorescent Ballast:

1. Provide ballast suitable for lamps specified.
2. Voltage: Match luminaire voltage and voltage of system to which applied.
3. Ballast to be protected with in-line fuse/fuseholder.
4. Provide disconnecting means for ballast that simultaneously disconnects all supply conductors to the ballast, including the grounded conductor.
5. Ballasts installed outdoors or in cool temperatures to be 0 degree ballasts.

C. Electronic Ballasts:

1. Fluorescent lamp ballasts shall be high frequency electronic type, operating lamps at a frequency of 20 kHz or higher with no detectable flicker.
2. Ballasts shall not be affected by lamp failure and shall yield normal lamp life.
3. Lamp current crest factor shall not exceed 1.6.
4. Ballasts shall operate at an input frequency of 60 Hz and an input voltage of 108 to 132 (120V models) or 249 to 305 (277V models).
5. Ballasts shall have power factor above 95 percent.
6. Ballasts that operate as a parallel circuit shall allow remaining lamp(s) to maintain full output if companion lamp(s) fail.
7. Ballasts shall carry five-year warranty, including labor allowance.
8. Ballast manufacturers shall have been producing electronic ballasts in the US for more than 10 years with a low failure rate.
9. Ballasts shall be accepted and listed by Underwriters Laboratories.
10. Ballasts shall comply with all applicable state and federal efficiency standards.
11. Ballasts shall comply with FCC and NEMA limits governing electromagnetic and radio frequency interference and shall not interfere with operation of other normal electrical equipment.
12. Ballasts shall meet all applicable ANSI and IEEE standards regarding harmonic distortion and surge protection.
13. Total harmonic distortion (THD) to be less than 20 percent and shall have a passive power factor corrective front end.
14. Ballasts to be in 1, 2, 3 or 4 lamp configuration as required to facilitate switching/circuitry shown on Drawings or as called for on Drawings. If not specifically called for or noted on Drawings provide minimum of one ballast per 2-lamp fixture, two ballasts per 3-lamp or 4-lamp fixture.

PART 3 - EXECUTION

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3.1 EXAMINATION

- A. Examine substrate and supporting grids for luminaires.
- B. Examine each luminaire to determine suitability for lamps specified.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and NEC.
- B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- C. Support luminaires larger than 2' x 4' size independent of ceiling framing.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- F. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.
- G. Install recessed luminaires to permit removal from below.
- H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- I. Recessed luminaires not rated for contact with insulation (Type IC) shall not be installed within 3" of any insulation or as required by the NEC. All recessed luminaires installed within three inches of insulation shall be identified for contact with insulation and bear the UL Type IC label.
- J. Install wall mounted luminaires and exit signs at height as indicated on Drawings, or as required by ADA, local codes and state codes. Where conflict exists between what is shown on Drawings and what is required by codes, install fixture as required by codes.
- K. Install accessories furnished with each luminaire.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. Install specified lamps in each luminaire
- O. Where ceiling mounted fixtures are called for in the Light Fixtures Schedule and on the Drawings, this Contractor shall provide fixture trims and supports as required to match type of ceiling system which will be furnished. No ceiling fixtures shall be ordered until the Ceiling System Installer has given written acceptance of the method and location of fixture hanging and fixture type.
- P. Fixtures supported by suspended ceiling systems shall be securely fastened to the ceiling framing member by mechanical means, such as bolts, screws, or rivets. Clips identified and listed for use with the type of ceiling framing member(s) and fixture(s) shall also be permitted. Ceiling framing members must be securely attached to each other and to the building structure as required by all applicable codes and standards.
- Q. All interior and exterior light fixtures shall not have any labels exposed to normal viewing angles. This includes manufacturer's labels and UL labels. All labels shall be concealed within the body of the fixture and/or luminaire. Manufacturer's name or logo shall not appear on the exterior of any light fixtures unless accepted in writing by the Engineer.
- R. Miscellaneous (provide and install complete):
  - 1. Tents as required for fixtures in fire rated ceilings as per applicable codes.

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2. Thermal protection for all fixtures with tents or fixtures surrounded by insulation as per applicable codes.
  3. Zero degree ballast for outdoor lighting fixtures.
  4. Heat removal or air supply slot covers for all fixtures requiring them as determined by Mechanical Engineer.
- S. Ceiling surface mounted fluorescent fixtures installed in exposed ceiling areas are to be suspended from ceiling structure with minimum 3/8" all-thread rods and 1-1/2" x 1-1/2" Kindorf channels, full length of fixture/row. Mount outlet box at structure with flexible connection to fixture.
- T. Coordinate fixtures installed in mechanical rooms with piping and ductwork prior to installation and relocate fixtures as required to provide proper illumination and access.
- U. Electrical Contractor shall remotely locate all transformers called for in these Specifications in a well ventilated and easily accessible space to comply with all codes. Revise circuitry as shown on plans as required to facilitate transformer/fixture location.
- V. Voltage for all fixtures shall match the voltage of the lighting circuit fixture is connected to. Coordinate with electrical drawings.
- W. All light fixtures shall have label near lamp socket, out of view of public stating maximum wattage of lamp allowed in fixture. Maximum wattage to be stated is wattage as shown on schedule of lighting equipment herein. Circuits are based on these wattages, circuitry, etc. Any failure to comply with this requirement shall be responsibility of Contractor. Location of labels must meet acceptance of Lighting Designer, Architect and Engineer.
- X. Verify all fluorescent fixtures have a luminaire disconnect. Provide luminaire disconnect in any luminaires where factory failed to install luminaire disconnect.

3.3 ADJUSTING

- A. Aim and adjust luminaires as directed.
- B. Adjust exit sign directional arrows as indicated.
- C. Relamp luminaires that have failed lamps at Substantial Completion.

3.4 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosure.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.5 DEMONSTRATION

- A. Provide demonstration of luminaire operation.

3.6 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.7 CLEAN-UP

- A. Luminaires:
  1. Clean free from dust and dirt. Wash lens and glassware using cleaner such as Windex and dry with absorbent paper. Clean plastic per manufacturer's recommendations; do not wipe. Lenses which are kept in original containers until immediately prior to final inspection

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may not require cleaning. Clean Alzak aluminum surfaces (reflectors, fixture cones and the like) per manufacturer's recommendations being careful to remove finger prints and smudges.

2. It is the Contractor's responsibility to remove any UL labels or manufacturers labels from areas of fixture exposed to view and relocate label to non-obtrusive area on fixture.

END OF SECTION



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SECTION 27 01 00 - OPERATION AND MAINTENANCE MANUALS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the requirements for Operation and Maintenance Manuals (O & M Manuals) specifically applicable to Division 27 Sections, in addition to Division 01 - General Requirements and any supplemental requirements/conditions.

1.2 OPERATION AND MAINTENANCE MANUALS

- A. O & M Manuals shall consist of a minimum of one hard cover view type 3-ring binder sized to hold 8 1/2" x 11" sheets for COMMUNICATIONS OPERATION AND MAINTENANCE. Refer to Division 1, general requirements for additional requirements.
1. Each binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1", maximum spline size to be 3". Provide additional binders if 3" size is not sufficient to properly hold submittals.
  2. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for O & M's at the end of this Section. Description sheet is to be white with black letters, minimum of 11" high and full width of pocket. Description is to describe project and match project drawing/project manual description. Description to include submittal type, i.e. COMMUNICATIONS OPERATION AND MAINTENANCE.
- B. O & M Data:
1. Manufacturer's operation and maintenance data is required for all items as called for in the specifications. O & M Manuals shall include manufacturer's name, model number(s), characteristics, manufacturer's agent, service agent, supplier, where and/or what item(s) are used for and description (i.e. surge suppression – intercom).
  2. Include troubleshooting instructions, list of special tools required, theory of operation, manufacturer's care and cleaning, preventative maintenance instructions, wiring diagrams, and point-to-point schematics.
- C. O & M Manuals to include:
1. Completed forms and information per Division 1, General Requirements, and this section of the specifications.
    - a) Table of Contents
    - b) Project Addresses
    - c) Reinforced Separation Sheets tabbed with the appropriate specification reference number and typed index for each Section in the Systems Schedule
    - d) Check Out Memo
    - e) Ground Test Information
    - f) Progress and Record Drawing Certification
    - g) Spare Parts Certification Memo
  2. Shop Drawings: Shop drawings shall be a copy of the final and accepted shop drawing submitted as required in Section Submittals. These shall be inserted in binder in proper order.
  3. Product Data: Product data and/or Catalog sheets shall be a copy of the final and accepted submittal submitted as required in Section Submittals. These shall be inserted in binder in proper order.
  4. Warranty/Guarantee: Provide copy of warranty/guarantee in respective location in O & M binder, (Power and Lighting) (Systems). Original warranty/guarantee is to be incorporated

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into separate project warranty book with warranty/guarantees provided for other sections and divisions of the specifications and submitted for Architectural/Owner acceptance.

5. Sections 27
  - a) Installer's name, address, phone, etc. for each system.
  - b) Authorized representatives name, address, phone, etc. for each system.
  - c) Equipment supplier's name, address, phone, etc. for each system.
  - d) Fire Alarm Systems.
    1. Product data and/or catalog sheets on equipment applicable to this project.
    2. Parts list.
    3. Wiring diagrams of panels.
    4. Shop drawing as submitted and accepted in submittal process.

1.3 PROCESSING SUBMITTALS

- A. Submit a minimum of three (3) sets of O & M Manuals, two (2) sets for Owner, one (1) set for Engineer.
- B. The Contractor shall review the manuals before submitting to the A/E. No request for payment will be considered until the brochure has been reviewed and submitted for acceptance.
- C. Provide additional copies if additional copies are required in other Divisions and/or sections of these specifications.

1.4 DELAYS

- A. Contractor is responsible for delays in job project accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.5 RESUBMITTALS

- A. The A/E shall be reimbursed cost to review re-submittals subsequent to the second submittal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

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PROJECT ADDRESSES

OWNER:

ARCHITECT:

CONSULTING ENGINEER:

Matern Professional Engineering, P.A.  
130 Candace Drive  
Maitland, Florida 32751  
Telephone No.: (407) 740-5020  
Fax No.: (407) 740-0365

GENERAL CONTRACTOR:

SUBCONTRACTOR:

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CHECK OUT MEMO FORM

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name:

Type of equipment checked:

Equipment Number:

Name of manufacturer of equipment:

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.\*
3. Written operating and maintenance information has been presented to the Contractor, and gone over with him in detail.
4. Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

Checked By: (Print or Type Name of Manufacturer's Representative)

(Address and Phone No. of Representative)

(Signature and Title of Representative)

(Date Checked)

Witnessed By: Signature and Title of Contractor Rep.)

\*Exceptions Noted At Time Of Check-Out (use additional page if necessary)

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GROUND TEST INFORMATION

PROJECT NAME: \_\_\_\_\_

GROUND TYPE: \_\_\_\_\_

TEST BY: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_

GROUND LOCATION: \_\_\_\_\_

GROUND TYPE (Rod, Water pipe, etc.):

PRIOR TO CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

AFTER CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

WEATHER CONDITIONS (Wet/Dry):

SOIL CONDITIONS (Wet/Dry):

CONTRACTOR'S REPRESENTATIVE:

DATE:

ENGINEER'S REPRESENTATIVE:

DATE:

OWNER'S REPRESENTATIVE:

DATE:

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PROGRESS AND RECORD DRAWING CERTIFICATION

NAME OF PROJECT:

DIVISION NUMBER AND NAME:

This is to certify that the attached marked-up design prints were marked as the items were installed at the site during construction, and that these prints represent as accurate "As-Builts" record of the work as actually installed. One copy will be turned over to the Owner at the instruction in Operation Conference. The duplicate copy is for the Engineer's files.

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Name Of General Contractor

---

BY: Authorized Signature And Title

Date

Name Of Subcontractor

---

BY: Authorized Signature And Title

Date

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SPARE PARTS CERTIFICATION MEMO

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name:

Type of Spare Parts:

Specification Reference:

Quantity of Spare Parts:

Signature below by the contractor signifies that the spare parts required by the drawings and/or specifications have been turned over to the Owner.

---

(Name of General Contractor)

---

(Signature, Title, Date)

---

(Name of Subcontractor)

---

(Signature, Title, Date)

---

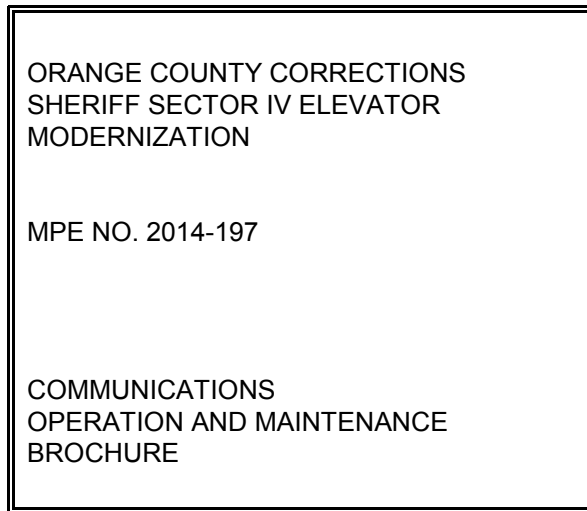
(Name of Owner)

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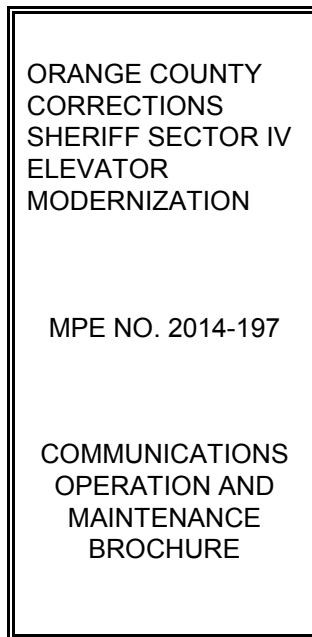
(Signature, Title, Date)

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BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder



(Size To 8-1/2" x 11")



(Size To 11")



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SECTION 27 05 00 - COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. The requirements in this section of the specification are in addition to all requirements in sections referenced above.

1.2 SUMMARY

- A. This section includes Basic Electrical Requirements specifically applicable to Division 27 Sections, in addition to Division 01 - General Requirements - and any supplemental requirements/conditions.

1.3 DESCRIPTION OF WORK

- A. The work required under this Division shall include all materials, labor and auxiliaries required to install a complete and properly operating electrical system.
- B. The Contractor shall furnish, perform, or provide all labor including planning, purchasing, transporting, storing, installing, testing, cutting and patching, trenching, excavating, backfilling, coordination, field verification, equipment (installation and safety), supplies, and materials necessary for the correct installation of complete electrical systems (as described or implied by these specifications and the applicable drawings) in strict accordance with applicable codes, which may not be repeated in these specifications, but are expected to be common knowledge of qualified Bidders.
- C. The Division 26 27 28 Contract Documents refer to work required in addition to (or above) the minimum requirements of the NEC and applicable local codes. All work shall comply with all applicable codes as a minimum and with the additional requirements called for in these Contract Documents.
- D. Only trained and qualified personnel shall be used by the Contractor to perform work. The Contractor shall not perform work which violates applicable Codes, even if called for in the Contract Documents. The Contractor's Bid shall include work necessary to completely install the electrical systems indicated by the Contract Documents in accordance with applicable Codes.
- E. Refer to other Division 26 27 28 Sections for additional work requirements.
- F. Connections of all items using electric power shall be included under this division of the specifications, including necessary wire, conduit, circuit protection, disconnects and accessories. Securing of roughing-in drawings and connection information for equipment involved shall also be included under this division. See other divisions for specifications for electrically operated equipment.

1.4 WORK SEQUENCE

- A. Install work in stages and/or phases to accommodate Owner's occupancy requirements. Coordinate electrical schedule and operations with Owner and Architect/Engineer.

1.5 CODES, FEES, AND STANDARDS

- A. Conform to all applicable requirements of Section Reference Standards and Regulatory Requirements.
- B. Obtain permits and request inspections from authority having jurisdiction and applicable utility companies.
- C. Pay for all required licenses, fees, and inspections.

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- D. Material shall be new and free of defects with UL listing or be listed with an approved, nationally recognized Electrical Testing Agency if and only if UL Listing is not available for material.

1.6 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown or described in the Contract Documents, unless prevented by Project conditions.
- B. The Contractor shall install all equipment so that all Code required and Manufacturer recommended servicing clearances are maintained. Contractor shall be responsible for the proper arrangement and installation of all equipment within any designated space. Should the Contractor determine that a departure from the Contract Documents is necessary, he shall submit to the A/E, for approval, detailed drawings of his proposed changes with his written reasons for the changes. No changes shall be implemented by the Contractor without the issuance of the required drawings, clarifications, and/or change orders.
- C. The Contractor shall verify finish dimensions at the project site in preference to using dimensions noted on Contract Documents.

1.7 INVESTIGATION OF SITE

- A. Check site and existing conditions thoroughly before bidding. Advise A/E of discrepancies or questions noted.
- B. Each Bidder shall visit the site and shall thoroughly familiarize himself with existing field conditions and the proposed work as described or implied by the Contract Documents. During the course of the site visit, the electrical bidder shall verify every aspect of the proposed work and the existing field conditions in the areas of construction and demolition which will affect his work. The Contractor will receive no compensation or reimbursement for additional expenses he incurs due to failure to make a thorough investigation of the existing facilities. This shall include rerouting around existing obstructions.
- C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.

1.8 CONTRACT DOCUMENTS

- A. These specifications and applicable drawings shall be considered supplementary, one to the other and are considered Contract Documents. All workmanship, methods, and/or material described or implied by one and not described or implied by the other shall be furnished, performed, or otherwise provided just as if it had appeared in both sets of documents.
- B. Where a discrepancy or conflict is found between these specifications and any applicable drawing, the Contractor shall notify the A/E in written form. In the event that a discrepancy exists between specifications and any applicable drawing, the most stringent requirement shall govern unless the discrepancy conflicts with applicable codes wherein the code shall govern. The most stringent requirement shall be that work, product, etc which is the most expensive and costly to implement.
- C. The drawings are diagrammatic and are not intended to include every detail of construction, materials, methods, and equipment. They indicate the result to be achieved by an assemblage of various systems. Coordinate equipment locations with Architectural and Structural drawings. Layout equipment before installation so that all trades may install equipment in spaces available. Coordinate installation in a neat and workmanlike manner.
- D. Wiring arrangements for equipment shown on the drawings are intended to be diagrammatic and do not show all required conductors and functional connections. All wiring and appurtenances required for the proper operation of all equipment to be connected shall be provided.

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- E. Specifications require the Contractor to provide shop drawings which shall indicate the fabrication, assembly, installation, and erection of a particular system's components. Drawings that are part of the Contract Documents shall not be considered a substitute for required shop drawings, field installation drawings, Code requirements, or applicable standards.
- F. Locations indicated for outlets, switches, and equipment are approximate and shall be verified by instructions in specifications and notes on the drawings. Where instructions or notes are insufficient to locate the item, notify the A/E.
- G. The Contractor shall take finish dimensions at the project site in preference to scaling dimensions on the drawings.
- H. Where the requirements of another Division, section, or part of these specifications exceed the requirements of this Division those requirements shall govern.

1.9 MATERIALS AND EQUIPMENT

- A. Material shall be new (except where specifically noted, shown or specified as "Reused") and/or denoted as existing) and shall be UL listed and bear UL label. Where no UL label listing is available for a particular product, material shall be listed with an approved, nationally recognized Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or exceeds available standards.
- B. Where Contract Documents list design selection or manufacturer, type, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to A/E's review and acceptance. Where Contract Documents list accepted substitutions, these items shall comply with Section Substitutions and requirements.
- C. When a product is specified to be in accordance with a trade association or government standard and at the request of A/E the Contractor shall furnish a certificate that the product complies with the referenced standard and supporting test data to substantiate compliance.
- D. Where multiple items of the same equipment or materials are required, they shall be the product of a single Manufacturer.
- E. Where the Contract Documents require materials and/or equipment installed, pulled, or otherwise worked on, the materials and/or equipment shall be furnished and installed by the Contractor responsible for Divisions 26 27 28 methods and materials unless specifically noted otherwise.
- F. Where the contract documents refer to the terms "furnish," "install," or "provide," or any combination of these terms) the materials and/or equipment shall be supplied and delivered to the project including all labor, unloading, unpacking, assembly, erection, anchoring, protecting supplies and materials necessary for the correct installation of complete system unless specifically noted otherwise.
- G. Before the Contractor orders equipment, the physical size of specified equipment shall be checked to fit spaces allotted on the drawings, with NEC working clearances provided. Internal access for proposed equipment substitutions shall be provided.
- H. Systems shall be protected from the weather during shipment, storage, and construction per manufacturer's recommendations for storage and protection. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner. No additional time will be allowed and the project completion date shall be maintained.
- I. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair and test damaged

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equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for the test shall be provided by the Contractor with no additional cost to the Contract.

- J. Material and equipment shall be provided complete and shall function up to the specified capacity/function. Should any material and/or equipment as a part or as a whole fail to meet performance requirements, replacements shall be made to bring performance up to specified requirements. Damages to finish by such replacements, alterations, or repairs shall be restored to prior conditions, at no additional cost to the Owner.
- K. Where the Contract Documents denote equipment and/or material to be 'new' and/or 'existing' and also provide no denotation for other equipment as to it being 'new' and/or 'existing,' this is not to infer that the non-denoted equipment is either new or existing, or opposite of the equipment that is denoted. The use of the terms 'new' or 'existing' is meant to clarify denoted equipment/materials for that item only, and the lack of the terms 'new' or 'existing' in relation to identifiers/notes/denotations on the drawings is not to infer that this non-denoted equipment or materials is new or existing.

1.10 SUPERVISION OF THE WORK

- A. Reference the General Conditions for additional requirements.
- B. The Contractor shall provide experienced, qualified, and responsible supervision for work. A competent foreman shall be in charge of the work in progress at all times. If, in the judgement of the A/E, the foreman is not performing his duties satisfactorily, the Contractor shall immediately replace him upon receipt of a letter of request from the A/E. Once a satisfactory foreman has been assigned to the work, he shall not be withdrawn by the Contractor without the written consent of the A/E.

1.11 COORDINATION

- A. Provide all required coordination and supervision where work connects to or is affected by work of other trades, and comply with all requirements affecting this Division. Work required under other divisions, specifications or drawings to be performed by this Division shall be coordinated with the Contractor and such work performed at no additional cost to Owner including but not limited to electrical work required for:
  - 1. Elevator equipment
- B. Contractor shall obtain set of contract documents from Owner for all areas of work noted above and include all electrical work in bid whether included in Divisions 26 27 28 Contract Documents or not.
- C. Installation studies shall be made to coordinate the electrical work with other trades. Work shall be preplanned. Unresolved conflicts shall be referred to the A/E prior to installation of the equipment for final resolution.
- D. For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings at 1/4" scale showing the actual physical dimension required for the installation to assure proper integration of equipment with building systems and NEC required clearances. Coordination drawings shall be provided for all areas of conflict as determined by the A/E.
- E. Secure accepted shop drawings from all required disciplines and verify final electrical characteristics before roughing in to equipment.
- F. Damage from interference caused by inadequate coordination shall be corrected at no additional cost to the Owner and the contract time for completion will not be extended.

1.12 PROVISION FOR OPENINGS

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- A. Locate openings required for work. Provide sleeves, guards or other accepted methods to allow passage of items installed.
- B. Coordinate with roofing Contractor on installation of electrical items which pierce roof. Roof penetrations shall not void roof warranty.
- C. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with Contractor prior to installation.

1.13 CUTTING AND PATCHING

- A. New Construction:
  - 1. Reference Division 01 - General Requirements.
  - 2. Cutting of work in place shall be cut, drilled, patched and refinished by trade responsible for initial installation.
  - 3. The Contractor shall be responsible for backfilling and matching new grades with adjacent undisturbed finished surface.
- B. Existing Construction:
  - 1. See Section Minor Electrical Demolition for Remodeling for additional requirements.

1.14 INSTALLATION

- A. Erect equipment to minimize interferences and delays in execution of the work.
- B. Take care in erection and installation of equipment and materials to avoid marring finishes or surfaces. Any damage shall be repaired or replaced as determined by the A/E at no additional cost to the Owner.
- C. Equipment supports shall be secured and supported from structural members except as field accepted by the A/E in writing.
- D. Plywood material shall not be used as a backboard for mounting panel boards, disconnects, motor starters, and dry type transformers. Provide "cast in place" type inserts or install expansion type anchor bolts. Electrical equipment shall not be mounted directly to dry wall for support without additional channels as anchors. Channels shall be anchored to the floor and structure above. Panelboards and terminal cabinets shall be provided with structural framing located within drywall partitions.
- E. The Contractor shall keep the construction site clean of waste materials and rubbish at all times. Upon completion of the work, the Contractor shall remove from the site all debris, waste, unused materials, equipment, etc.
- F. Inserts, pipe sleeves, supports, and anchorage of electrical equipment shall be provided. Where items are to be set or embedded in concrete or masonry, the items shall be furnished and a layout made prior to the setting or embedment thereof, so as to cause no delay to the project schedule.

1.15 PROGRESS AND RECORD DRAWINGS

- A. Keep two sets of blue-line prints on the job, and neatly mark up design drawings each day as components are installed. Different colored pencils shall be used to differentiate each system of electrical work. Cost of prints and this labor task shall be included under this Division. All items on Progress Drawings shall be shown in actual location installed. Change the equipment schedules to agree with items actually furnished.
- B. Prior to request for substantial completion observation, furnish a set of neatly marked prints showing "as-installed" (as-built) condition of all electrical installed under this Division of the

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specifications. Marked up prints are to reflect all changes in work including change orders, field directives, addenda from bid set of Contract Documents, request for information responses, etc. Marked up set of prints to show:

1. All raceways 1-1/2" and above, exactly as installed.
  2. All site raceways exactly as installed.
  3. Any combining of circuits (which is only allowed by specific written permission) or change in homerun outlet box shall be made on as-builts.
  4. Any circuit number changes on plan shall be indicated on as-builts.
  5. Any panelboard schedule changes shall be indicated on as-builts and final panelboard schedules..
- C. Marked up prints as noted above are to be submitted to A/E for review.. Contractor shall review submitted "as-builts" with Engineer in the field. Contractor shall verify every aspect for accuracy.
- D. After acceptance of marked up prints by A/E with all changes, additions, etc. included on accepted marked up prints, submit set prior to request for final payment and/or request for final observation.
- E. Where the Contractor has failed to produce representative "as-built" drawings in accordance with requirements specified herein, the Contractor shall reimburse Engineer all costs to produce a set of "as-built" drawings to the Architect/Owner satisfaction.

1.16 "OBSERVATION OF WORK" REPORT

- A. Reference the General Conditions.
- B. Items noted by A/E or his representative during construction and before final acceptance which do not comply with the Contract Documents will be listed in a "Observation of Work" report which will be sent to the Contractor for immediate action. The Contractor shall correct all deficiencies in a prompt concise manner. After completion of the outstanding items, provide a written confirmation report for each item to the A/E. The report shall indicate each item noted, and method of correction. Enter the date on which the item was corrected, and return the signed reports so items can be rechecked. Failure to correct the deficiencies in a prompt concise manner or failure to return the signed reports shall be cause for disallowing request for payments.
- C. Items noted after acceptance during one-year guarantee period shall be checked by the Contractor in the same manner as above. The signed reports are to be returned by him when the items have been corrected.

1.17 SYSTEMS WARRANTY

- A. Reference the General Conditions.
- B. The work shall include a one-year warranty. This warranty shall be by the Contractor to the Owner for any defective workmanship or material which has been furnished at no cost to the Owner for a period of one year from the date of substantial completion of each System. Warranty shall not include lamps in service after one month from date of substantial completion of the System. Explain the provisions of warranty to the Owner at the "Demonstration of Completed System" meeting to be scheduled with the Owner upon project completion.
- C. Where items of equipment or materials carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material.
- D. Where extended warranty or guarantee are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.

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- E. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work which shall not alter the Contractor's warranty.

1.18 WASTE MATERIALS DISPOSAL

- A. Contractor shall include in his bid the transport and disposal or recycling of all waste materials generated by this project in accordance with all rules, regulations and guidelines applicable. Contractor shall comply fully with Florida statute 403.7186 regarding mercury containing devices and lamps. Lamps, ballasts and other materials shall be transported and disposed of in accordance with all DEP and EPA guidelines applicable at time of disposal. Contractor shall provide owner with written certification of accepted disposal.

1.19 SUBSTANTIAL COMPLETION

- A. Refer to Div 26 Common Work Results.
- B. Work shall be complete as required by authorities having jurisdiction and the general conditions of the contract prior to request for substantial completion observation. Work must be deemed substantially complete by A/E to fulfill requirements.

1.20 PROHIBITION OF ASBESTOS AND PCB

- A. The use of any process involving asbestos or PCB, and the installation of any product, insulation, compound of material containing or incorporating asbestos or PCB, is prohibited. The requirements of this specification for complete and operating electrical systems shall be met without the use of asbestos or PCB.
- B. Prior to the final review field visit, the Contractor shall certify in writing that the equipment and materials installed in this Project under this Division 27 contain no asbestos or PCB's. Additionally, all manufacturers shall provide a statement with their submittal that indicates that their product contains no asbestos or PCB's. This statement shall be signed and dated by a duly authorized agent of the manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

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SECTION 27 05 07 - SUBMITTALS FOR COMMUNICATIONS SYSTEMS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Requirements for submittals specifically applicable to Division 27 Sections, in addition to Division 01 - General Requirements and any supplemental requirements/conditions.
- B. See Section Substitutions for additional requirements when submittal consists of accepted substitution equipment.

1.3 SUBMITTAL OF "ACCEPTED SUBSTITUTE" EQUIPMENT/PRODUCT

- A. Representation: In submitting item, equipment, product, etc. that has been listed on contract drawings, in contract documents or in an addenda, Contractor represents that he:
  - 1. Has investigated substituted item and has determined that it is equal or superior to specified product in all aspects and that use of substituted item will not require any additional time to the Contract.
  - 2. Will coordinate installation of accepted substitution into work, making changes as may be required to complete work in all aspects.
  - 3. Waives all claims for additional costs related to substitution which may subsequently become apparent.
  - 4. Will provide the same warranties for the substitution as for the product specified.
  - 5. Will absorb all costs incurred by the substitution when affecting other trades including but not limited to electrical, structural, architectural, etc.
  - 6. Will absorb any cost incurred by the Engineer in review of the substituted product if the acceptance of the substituted item creates the need for system modification and/or redesign, or if the substituting contractor exhibits negligence in his substituting procedure thus submitting inferior, misapplied or miss-sized equipment. In the event of additional engineering costs, the billing structure shall be agreed upon prior to review by all involved parties.
- B. Substitutions that cannot meet space requirements or other requirements of these Specifications, whether accepted or not, shall be replaced at the Contractor's expense with no additional time added to the Contract.

1.4 SUBMITTALS

- A. Submittals shall consist of a minimum of one (or if required) two hard cover view type 3-ring binder(s) White, sized to hold 8-1/2" x 11" sheets; one (1) for "ELECTRICAL SUBMITTALS" (Power and Lighting); one (1) for "SYSTEMS SUBMITTALS" Where "SYSTEMS SUBMITTALS" is not applicable, only one (1) binder is required.
  - 1. Binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1", maximum spline size to be 3" (provide additional binders if 3" size is not sufficient to properly hold submittals).
  - 2. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for Submittals included at end of this Section. Description sheet is to be white with black letters, minimum of 11" high and full width of pocket. Description is to describe project and match project drawing/project



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manual description. Description to include submittal type, i.e., "ELECTRICAL SUBMITTALS" for Power and Lighting, (and if required) "SYSTEMS SUBMITTALS."

B. Submittals Binders to include:

1. First sheet shall be prepared and filled out by Contractor and shall list project addresses, telephones, etc.; see "PROJECT ADDRESSES" Form included at end of this section.
2. Second sheet in binder shall be a photocopy of the Electrical Index pages in Specifications.
3. Provide reinforced separation sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule.
4. Submittals consisting of marked catalog sheets or shop drawings shall be inserted in the binder in proper order. Submittal data shall be presented in a clear and thorough manner. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Markings shall be made with arrows or circles (highlighting is not acceptable).
5. Shop Drawings: Drawings to include identification of project and names of Architect, Engineer, General Contractor, subcontractor and supplier, data, number sequentially and indicate the following:
  - a) Fabrication and erection dimensions.
  - b) Arrangements and sectional views.
  - c) Necessary details, including complete information for making connections with other work.
  - d) Kinds of materials and finishes.
  - e) Descriptive names of equipment.
  - f) Modifications and options to standard equipment required by the work.
  - g) Leave blank area, size approximately 4 by 2 1/2 inches, near title block (for A/E's stamp imprint).
  - h) In order to facilitate review of drawings, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and specification paragraph numbers where items occur in the Contract Documents.
  - i) Conduit/raceway rough-in drawings.
  - j) Items requiring shop drawings include (but not limited to):
    1. UL listed fire and smoke stopping assemblies for each applicable penetration
  - k) See specific sections of Specifications for further requirements.
6. Product Data: Technical data is required for all items as called for in the Specifications regardless if item furnished is as specified.
  - a) Submit technical data verifying that the item submitted complies with the requirements of the Specifications. Technical data shall include manufacturer's name and model number, dimensions, weights, electrical characteristics, and clearances required. Indicate all optional equipment and changes from the standard item as called for in the Specifications. Furnish drawings, or diagrams, dimensioned and in correct scale, covering equipment, showing arrangement of components and overall coordination.
  - b) In order to facilitate review of product data, insofar as practicable, they shall be

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noted, indicating by cross reference the contract drawings, note, and/or specification paragraph numbers where and/or what item(s) are used for and where item(s) occur in the contract documents.

- c) See specific sections of Specifications for further requirements.

1.5 PROCESSING SUBMITTALS

- A. Submit under provisions of the General Requirements of the Contract and this section of the Specifications, whichever is the most strict.
- B. Quantity of submittals with marking on each copy shall be submitted under provisions of General Requirements of the Contract, Division 01, and this and other sections of the Specifications. Original submittal must contain 3-ring binders with:
1. Systems and Fire Alarm Product Data
- C. Remainder of submittals are to be submitted no later than 60 days after award of contract or 60 days prior to Request for Substantial Completion whichever is earlier.
- D. The Contractor shall review all submittals before submitting to the A/E. No request for payment will be considered until the submittals have been reviewed and submitted for approval.
- E. Product Data: For standard manufactured materials, products and items, submit one (1) copy or sets of data (per binder). If submittal is rejected, resubmittal shall contain same quantity of new data.
- F. Shop Drawings: For custom fabricated items and systems shop drawings, initially submit a transparency (suitable for reproduction) together with two (2) prints made therefrom. When submittal is acceptable, furnish one (1) print per binder made from the accepted transparency.
- G. Shop Drawing Review Notation.

<u>Action</u>	<u>Description</u>
1. No Exception Noted	No exceptions taken. Resubmittal not required.
2. Rejected	Not in compliance with Contract Documents. Resubmit.
3. Submit Specific Item	Resubmit item as specified.
4. Make Corrections Noted	Make corrections noted, resubmittal not required.
5. Revise and Resubmit	Make corrections noted, resubmittal is required
6. Review not Required	Not required for review. No action taken. Copy retained for reference.

- H. Acceptance: When returned to Contractor, submittals will be marked with A/E's stamp. If box marked "Rejected" "Revise and Resubmit" or "Submit Specific Item" is checked, submittal is not accepted and Contractor is to correct and resubmit as noted, otherwise submittal is accepted and Contractor is to comply with notation making necessary corrections on submittal. Review comments will generally not be on each individual submittal sheet, and will be on a separate sheet attached to shop drawing transmittal, submittal as a whole or each submittal section.
- I. Note that the acceptance of shop drawings or other information submitted in accordance with the requirements specified above, does not assure that the Engineer, Architect, or any other Owner's Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved, the ability of the material or equipment involved or the Mechanical/Electrical performance of equipment. Acceptance of shop drawings does not invalidate the plans and Specifications if in conflict, unless a letter requesting such change is

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submitted and accepted on the Engineer's letterhead.

1.6 DELAYS

- A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.7 RE-SUBMITTALS

- A. The A/E shall be reimbursed for all costs to review resubmittals subsequent to the second submission for the same product. Cost will be billed to Contractor at Engineer's standard hourly rate.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

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PROJECT ADDRESSES

OWNER:

ARCHITECT:

ENGINEER:

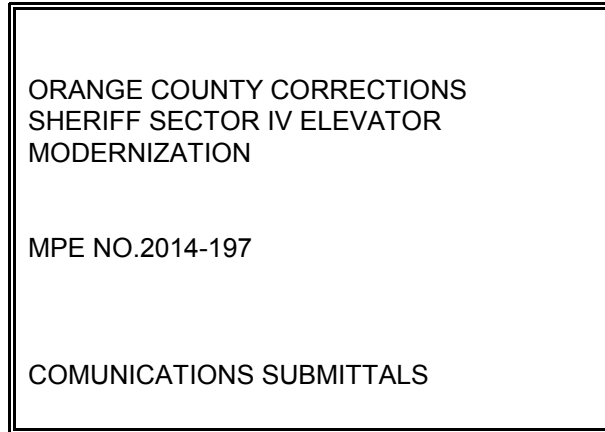
Matern Professional Engineering, P.A.  
130 Candace Drive  
Maitland, Florida 32751  
Telephone No.: (407) 740-5020  
Fax No.: (407) 740-0365

GENERAL CONTRACTOR:

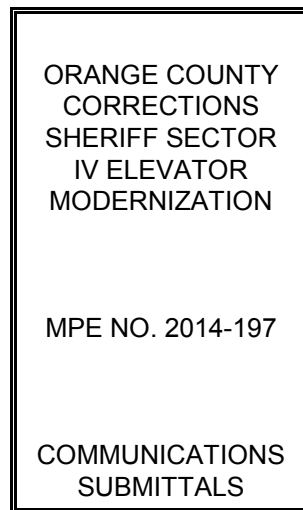
SUBCONTRACTOR:

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BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder



(Size To 8-1/2" x 11")



(Size To 11")

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SECTION 27 05 29 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 Refer to 26 05 29 for requirements.

END OF SECTION

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SECTION 27 05 33 - CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

- 1. Electrical Metallic Tubing (EMT) – NEC 358

B.

1.3 REFERENCES

- A. ANSI C80.3 - Electrical Metallic Tubing - Zinc Coated
- B. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- C. ANSI/NFPA 70 - National Electrical Code
- D. NECA Standard Practices for Good Workmanship in Electrical Contracting

1.4 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70. (See drawings and this and other sections of these specifications for additional requirements).

1.5 SUBMITTALS

- A. Submit catalog cut sheet showing brand of conduit to be used and showing that conduit is UL listed and labeled, and manufactured in the United States.
- B. Submit catalog cut sheet on all types of conduit bodies, and fittings.
- C. Product data shall be submitted for acceptance on:
  - 1. Conduits
  - 2. Conduit straps, hangers and fittings
- D. Submit UL listed fire and smoke stopping assemblies for each applicable application.
- E. Product data shall prove compliance with Specifications, National Electrical Code, National Board of Fire Underwriters, manufacturer's specifications and written installation data.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents to accurately record actual routing of conduits larger than 1.25 inches.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from sun, rain, corrosion and entrance of debris by storing above grade. Provide

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appropriate covering.

- D. Protect PVC conduit from sunlight.

1.9 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All conduits shall bear UL label or seal and shall be manufactured in the United States.
- B. Conduit systems and all related fittings, boxes, supports, and hangers must meet all the requirements of national, state, local and other Federal codes where applicable.

2.2 MINIMUM TRADE SIZE

- A. E.M.T. - 3/4".

2.3 RIGID METAL CONDUIT (RMC)

- A. Comply with:
  - 1. ANSI C80.1
  - 2. UL Spec - No. 6
  - 3. NEC 344
- B. Conduit material:
  - 1. Zinc coated or hot dipped galvanized steel.
- C. Fittings:
  - 1. Threaded.
  - 2. Insulated bushings shall be used on all rigid steel conduits terminating in panels, boxes, wire gutters, or cabinets, and shall be impact resistant plastic molded in an irregular shape at the top to provide smooth insulating surface at top and inner edge. Material in these bushings must not melt or support flame.
  - 3. Zinc plated or hot dipped galvanized malleable iron or steel.
- D. Conduit Bodies:
  - 1. Comply with ANSI/NEMA FB 1.
  - 2. Threaded hubs.
  - 3. Zinc plated or hot-dipped galvanized malleable iron.

2.4 ELECTRICAL METALLIC TUBING (EMT)

- A. Comply with:
  - 1. UL 797
  - 2. ANSI C80.3
  - 3. NEC 358
  - 4. ANSI/UL797
- B. Conduit material: Galvanized steel tubing.
- C. Fittings:
  - 1. ANSI/NEMA FB 1
  - 2. Set screw



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3. Zinc plated malleable iron or steel.
4. Concrete tight.
5. T&B Series 5031/5030.

2.5 EXPANSION FITTINGS

- A. Expansion fittings shall be:
1. UL Listed, hot dipped galvanized inside and outside providing a 4" expansion chamber - when used with rigid conduit, intermediate metal conduit and electrical metallic conduit, or:
  2. Be polyvinyl chloride and shall meet the requirements of and as specified elsewhere for non-metallic conduit and shall provide a 6" expansion chamber.
  3. Hot dipped galvanized expansion fitting shall be provided with an external braided grounding and bonding jumper with accepted clamps, UL Listed for the application.
  4. Expansion fitting, UL Listed for the application and in compliance with the National Electrical Code without the necessity of an external bonding jumper may be considered. Submit fitting with manufacturer's data and UL Listing for acceptance prior to installation.

PART 3 - EXECUTION

3.1 LOCATION REQUIREMENTS

- A. Interior Dry Locations:
1. Concealed: Use rigid metal conduit or electrical metallic tubing. Rigid non-metallic conduit may be used inside block walls up to first outlet to a maximum of 40" A.F.F. except where prohibited by the NEC (places of assembly, etc.).
  2. Exposed: Use rigid metal conduit or electrical metallic tubing. EMT may only be used where not subject to damage, which is interpreted by this specification to be above 90" AFF.
  3. Concealed or exposed flexible conduit:
    - a) Concealed flexible steel conduit or seal tight flexible steel conduit in lengths not longer than six (6) feet in length with a ground conductor installed in the conduit or an equipment ground conductor firmly attached to the terminating fitting at the extreme end of the flex. Exposed flexible steel conduit or seal tight flexible steel conduit shall not exceed two (2) feet in length, unless written authorization by A/E for specific conditions is granted.
- B. Interior Wet and Damp Locations:
1. Use rigid galvanized steel or intermediate metal conduit.
- C. Concrete Columns or Poured in-place Concrete Wall Locations:
1. Use rigid non-metallic conduit. Penetration shall be by accepted metal raceway (i.e. metal conduit as required elsewhere in these specifications).

3.2 SUPPORTS

- A. Arrange supports to prevent misalignment during wiring installation.
- B. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- C. Group related conduits; support using conduit rack. Construct rack using steel channel; (minimum 24", increase distance as required) provide space on each for 25 percent additional conduits.
- D. Fasten conduit supports to building structure and surfaces under provisions of Section Supporting Devices.

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- E. Do not support conduit with wire, metal banding material, or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach conduit to ceiling support wires.
- G. Conduits shall not be supported from ceiling grid supports, plumbing pipes, duct systems, heating or air conditioning pipes, or other building systems.
- H. Non-bolted conduit clamps, as manufactured Caddy Corp. are not accepted. Supporting conduit and boxes with wire is not accepted. All raceways except those from surface-mounted switches, outlet boxes or panels shall be supported with clamp fasteners with toggle bolt on hollow walls, and with lead expansion shields on masonry.

3.3 EXPANSION FITTINGS

- A. Provide expansion fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- B. Expansion fittings shall be installed in the following cases: In each conduit run wherever it crosses an expansion joint in the concrete structure; on one side of joint with its sliding sleeve end flush with joint, and with a length of bonding jumper in expansion equal to at least three times the normal width of joints; in each conduit run which mechanically attached to separate structures to relieve strain caused by shift on one structure in relation to the other; in straight conduit run above ground which is more than one hundred feet long and interval between expansion fittings in such runs shall not be greater than 100 feet.

3.4 GROUNDING

- A. All raceways shall have a copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC codes.
- B. Grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings.
- C. Grounding conductors run with exterior/ underground feeders shall be bare only.
- D. Grounding conductors run with feeders shall be bonded to portions of conduit that are metal by accepted ground bushings.
- E. See other sections of these specifications for additional requirements.
- F. Grounding conductors (including lightning protection down conductors) run in metal conduit shall be bonded to metal conduit at both ends.

3.5 FIRE AND SMOKE STOPPING

- A. Contractor is to provide fire stopping and/or smoke stopping for all penetrations of existing (or new if applicable) fire or smoke barrier walls, chases, floors, etc. as required to maintain existing rating of floor, wall, chase, etc.
- B. Install conduit to preserve fire resistance rating of partitions and other elements.
- C. Install fireproofing material to maintain existing rating of floor, beams, etc. damaged or removed by renovation.
- D. Fire and smoke stopping material: A two-part silicone foam or a one-part putty, UL classified and FM accepted with flame spread of 0 and smoke development not to exceed 50 in accord with ASTM E84. Material shall be suitable for penetration seals through fire-rated floors and walls when tested in accord with ASTM E119. Material shall not melt or soften at high temperatures, shall be suitable for direct outdoor and ultraviolet exposures, shall cure to give a tight compression fit, and shall not produce toxic fumes. Material, when heated, shall expand to fill and hold penetration closed where burn out of cable insulation or ATC tubing occurs.

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3.6 GENERAL

- A. Install conduit in accordance with NECA "Standard of Installation." Contractor shall layout all work prior to rough-in.
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange conduit to maintain headroom and present neat appearance.
- D. Route conduit installed above accessible ceilings or exposed to view parallel or perpendicular to walls. Do not run from point to point.
- E. Route conduit in and under slab from point-to-point.
- F. Do not cross conduits in slab.
- G. Maintain adequate clearance between conduit and piping.
- H. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- I. Cut conduit square using saw or pipecutter; de-burr cut ends.
- J. Bring conduit to shoulder of fittings; fasten securely.
- K. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- L. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.
- M. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- N. Provide and install pullboxes, junction boxes, fire barrier at fire rated walls etc., as required by NEC Article 300, whether shown on drawings or not.
- O. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- P. Ground and bond conduit under provisions of Section Grounding and Bonding.
- Q. Identify conduit under provisions of Section Electrical Identification.
- R. Install all conduits concealed from view unless specifically shown otherwise on drawings
- S. Rigid steel box connections shall be made with double locknuts and bushings.
- T. All raceways shall be kept clear of plumbing fixtures to facilitate future repair or replacement of said fixtures without disturbing wiring. Except where it is necessary for control purposes, all raceways shall be kept away from items producing heat.
- U. All raceway runs in masonry shall be installed at the same time as the masonry so that no face cutting is required, except to accommodate boxes.
- V. All raceways shall be run from outlet to outlet as shown on the drawings, unless permission is granted to alter arrangement shown. If permission is granted arrangement shall be marked on field set of drawings as previously specified.
- W. Spare conduit stubs shall be capped and location and use marked with concrete marker set flush with finish grade. Marker shall be 6" round x 6" deep with appropriate symbol embedded into top to indicate use. Also, tag conduits in panels where originating.
- X. All conduit stubbed above floor shall be strapped to Kindorf channel supported by conduit driven into ground or tied to steel. Spare conduit stubs shall be capped with a UL listed and accepted cap or plug for the specific intended use and identified with ink markers as to source and labeled "Spare."

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- Y. Provide conduit seal-offs wherever conduit crosses obvious temperature changes (i.e. from inside to outside of coolers, freezers, etc.).
- Z. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified under other Sections of these specifications.
- AA. All raceways shall be run in neat and workmanlike manner and shall be properly in accordance with latest edition of NEC with accepted conduit clamps, hanger rods and structural fasteners.
- BB. All raceway runs, whether terminated in boxes or not, shall be capped during the course of construction and until wires are pulled in, and covers are in place. No conductors shall be pulled into raceways until construction work which might damage the raceways has been completed.
- CC. Electrical raceways shall be supported independently of all other systems and supports, and shall in every case avoid proximity to other systems which might cause confusion with such systems or might provide a chance of electrolytic actions, contact with live parts or excessive induced heat.

END OF SECTION

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SECTION 27 08 00 - DEMONSTRATION OF COMPLETED COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the requirements for demonstration of completed electrical systems:

1.3 DESCRIPTION

- A. Demonstrate to Owner the essential features of the following electrical systems:
  - 1. Communications Systems
    - a) Each and every system included in Sections Systems.
- B. Upon completion of testing, each system is to be demonstrated only once.

1.4 TIME

- A. The demonstration shall be held upon completion of all systems at a date to be agreed upon in writing by the Owner or his representative.

1.5 ATTENDING PARTIES

- A. The demonstration shall be held by this Contractor in the presence of the Owner, and the manufacturer's representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DEMONSTRATION

- A. Demonstrate the function and location (in the structure) of each system, and indicate its relationship to the riser diagrams and drawings.
- B. Demonstrate by "start-stop operation" how to work the controls, how to reset protective devices, how to replace fuses, and what to do in case of emergency.
- C. Performance Verification and Demonstration to Owner
  - 1. Submit one copy of Check Out Memo Form for each O & M Manual. (Form at end of this section.) Form shall be signed by the contractor, subcontractor and Owner's authorized representative for "each" type of equipment and system. Complete an individual form for each item, equipment and system.

END OF SECTION

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SHERIFF SECTOR IV ELEVATOR MODERNIZATION

CHECK OUT MEMO FORM

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name \_\_\_\_\_

Type of Equipment Checked \_\_\_\_\_

Equipment Number \_\_\_\_\_

Equipment Manufacturer \_\_\_\_\_

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.\*
3. Written operating and maintenance information has been presented to the Contractor, and gone over with him in detail.
4. Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

**CHECKED BY:**

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE (PRINT)

\_\_\_\_\_  
ADDRESS

\_\_\_\_\_  
TELEPHONE/FAX/EMAIL

\_\_\_\_\_  
MANUFACTURER'S REPRESENTATIVE (SIGNATURE, TITLE)

\_\_\_\_\_  
DATE CHECKED

**WITNESSED BY:**

\_\_\_\_\_  
CONTRACTOR'S REPRESENTATIVE (SIGNATURE, TITLE)

\*EXCEPTIONS NOTED AT TIME OF CHECK-OUT (USE ADDITIONAL PAGE IF NECESSARY):

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SECTION 28 01 00 - OPERATION AND MAINTENANCE MANUALS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 sections apply to this Section.
- B. The requirements in this section of the specifications are in addition to all requirements in sections referenced above.

1.2 SUMMARY

- A. This section includes the requirements for Operation and Maintenance Manuals (O & M Manuals) specifically applicable to Divisions 28 Sections, in addition to Division 01 - General Requirements and any supplemental requirements/conditions.

1.3 OPERATION AND MAINTENANCE MANUALS

- 1. O & M Manuals shall consist of a minimum of one (or if required) two hard cover view type 3-ring binder(s) sized to hold 8 1/2" x 11" sheets; one (1) for one (1) for Electronic Safety and Security.
  - 2. Each binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1", maximum spline size to be 3". Provide additional binders if 3" size is not sufficient to properly hold submittals.
  - 3. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for O & M's at the end of this Section. Description sheet is to be white with black letters, minimum of 11" high and full width of pocket. Description is to describe project and match project drawing/project manual description. Description to include submittal type, i.e. Electronic Safety and Security for Division 28.
- B. O & M Data:
    - 1. Manufacturer's operation and maintenance data is required for all items as called for in the specifications. O & M Manuals shall include manufacturer's name, model number(s), characteristics, manufacturer's agent, service agent, supplier, where and/or what item(s) are used for and description (i.e. surge suppression - switchboard MDPA).
    - 2. Include troubleshooting instructions, list of special tools required, theory of operation, manufacturer's care and cleaning, preventative maintenance instructions, wiring diagrams, and point-to-point schematics.
  - C. O & M Manuals to include:
    - 1. Completed forms and information per Division 01, General Requirements, and this section of the specifications.
      - a) Table of Contents
      - b) Project Addresses
      - c) Reinforced Separation Sheets tabbed with the appropriate specification reference number and typed index for each Section in the Systems Schedule
      - d) Check Out Memo
      - e) Conductor Insulation Resistance Test Memo
      - f) D-C High Voltage Cable Test Report
      - g) Ground Test Information
      - h) Motor Test Information
      - i) Voltage and Amperage Readings Tabulated Data.

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- j) Progress and Record Drawing Certification
- k) Spare Parts Certification Memo
- 2. Shop Drawings: Shop drawings shall be a copy of the final and accepted shop drawing submitted as required in Section Submittals. These shall be inserted in binder in proper order.
- 3. Product Data: Product data and/or Catalog sheets shall be a copy of the final and accepted submittal submitted as required in Section Submittals. These shall be inserted in binder in proper order.
- 4. Warranty/Guarantee: Provide copy of warranty/guarantee in respective location in O & M binder, (Systems). Original warranty/guarantee is to be incorporated into separate project warranty book with warranty/guarantees provided for other sections and divisions of the specifications and submitted for Architectural/Owner acceptance.
- 5. Copies of electrical panel schedules and electrical panel directories included with the corresponding specification section
- 6. Section 28
  - a) Installer's name, address, phone, etc. for each system.
  - b) Authorized representatives name, address, phone, etc. for each system.
  - c) Equipment supplier's name, address, phone, etc. for each system.
  - d) Fire Alarm, Sound/Paging, Television, Security, Closed Circuit systems.
    - 1. Product data and/or catalog sheets on equipment applicable to this project.
    - 2. Parts list.
    - 3. Installation/removal instructions.
    - 4. Wiring diagrams of panels.
    - 5. Point-to-point wiring diagrams of system.
    - 6. Operation and maintenance requirements.
    - 7. Shop drawing as submitted and accepted in submittal process.
    - 8. Check-Out Memo Form

1.4 PROCESSING SUBMITTALS

- A. Submit a minimum of three (3) sets of O & M Manuals, two (2) sets for Owner, one (1) set for Engineer.
- B. The Contractor shall review the manuals before submitting to the A/E. No request for payment will be considered until the brochure has been reviewed and submitted for acceptance.
- C. Provide additional copies if additional copies are required in other Divisions and/or sections of these specifications.

1.5 DELAYS

- A. Contractor is responsible for delays in job project accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.6 RESUBMITTALS

- A. The A/E shall be reimbursed cost to review re-submittals subsequent to the second submittal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)



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PROJECT ADDRESSES

OWNER:

ARCHITECT:

CONSULTING ENGINEER:

Matern Professional Engineering, P.A.  
130 Candace Drive  
Maitland, Florida 32751  
Telephone No.: (407) 740-5020  
Fax No.: (407) 740-0365

GENERAL CONTRACTOR:

SUBCONTRACTOR:

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CHECK OUT MEMO FORM

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name:

Type of equipment checked:

Equipment Number:

Name of manufacturer of equipment:

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.\*
3. Written operating and maintenance information has been presented to the Contractor, and gone over with him in detail.
4. Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

Checked By: (Print or Type Name of Manufacturer's Representative)

(Address and Phone No. of Representative)

(Signature and Title of Representative)

(Date Checked)

Witnessed By: Signature and Title of Contractor Rep.)

\*Exceptions Noted At Time Of Check-Out (use additional page if necessary)

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CONDUCTOR INSULATION RESISTANCE TEST MEMO

PROJECT NAME: \_\_\_\_\_

CONDUCTOR FROM \_\_\_\_\_ TO

SIZE

INSULATION TYPE

INSULATION VOLTAGE RATING

DATE \_\_\_\_\_ TIME

WEATHER CONDITIONS

TEST VOLTAGE (DC)

RANGE

MEGGER INSTRUMENT/SERIAL NUMBER

TESTING METHODOLOGY

INSULATION RESISTANCE MEASUREMENT (ACCEPTABLE MEASUREMENT NOT TO BE LESS THAN (1) MEGOHM):

PHASE A TO GROUND \_\_\_\_\_

PHASE B TO GROUND \_\_\_\_\_

PHASE C TO GROUND \_\_\_\_\_

NEUTRAL TO GROUND \_\_\_\_\_

ISOLATED GROUND TO GROUND

CONTRACTOR'S REPRESENTATIVE:

DATE:

OWNER'S REPRESENTATIVE:

DATE:

ENGINEER'S REPRESENTATIVE:

DATE:

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D-C HIGH VOLTAGE CABLE TEST REPORT

Project Name: \_\_\_\_\_

Location: \_\_\_\_\_

Description: \_\_\_\_\_

Rated Voltage: \_\_\_\_\_

TEST DATA

Set Leakage @ Test Voltage \_\_\_\_\_ ma Variac \_\_\_\_\_

Pri. Voltage \_\_\_\_\_

Sphere Gap \_\_\_\_\_ Inches

Duct Temp. \_\_\_\_\_ Ambient Temp. \_\_\_\_\_ Weather \_\_\_\_\_

Cable Status \_\_\_\_\_ 1 hour prior to test

---

Phase or Conductor	<u>A</u>	<u>B</u>	<u>C</u>	Remarks
Starting Time	<u>MA</u>	<u>MA</u>	<u>MA</u>	

- 0
- 15 sec.
- 30 sec.
- 45 sec.
- 1 min.
- 2 min.
- 3 min.
- 4 min.
- 5 min.

Final Test Voltage \_\_\_\_\_

Time Finish: \_\_\_\_\_

KV DC after 1 min.

Test Procedure \_\_\_\_\_ No. of Terminals \_\_\_\_\_

Joints \_\_\_\_\_

Witnessed by: \_\_\_\_\_ Performed by: \_\_\_\_\_

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GROUND TEST INFORMATION

PROJECT NAME: \_\_\_\_\_

GROUND TYPE: \_\_\_\_\_

TEST BY: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_

GROUND LOCATION: \_\_\_\_\_

GROUND TYPE (Rod, Water pipe, etc.):

PRIOR TO CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

AFTER CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

WEATHER CONDITIONS (Wet/Dry):

SOIL CONDITIONS (Wet/Dry):

CONTRACTOR'S REPRESENTATIVE:

DATE:

ENGINEER'S REPRESENTATIVE:

DATE:

OWNER'S REPRESENTATIVE:

DATE:

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MOTOR TEST INFORMATION

PROJECT NAME:  
DESCRIPTION OF MOTOR:  
NAME OF CHECKER:  
DATE CHECKED:

(a) Name and identifying mark of motor (indicate at existing)

(b) Manufacturer

(c) Model Number

(d) Serial Number

(e) RPM

(f) Frame Size

(g) Code Letter

(h) Horsepower

(i) Nameplate Voltage and Phase

(j) Nameplate Amps

(k) Actual Voltage

(l) Actual Amps

(m) Starter Manufacturer

(n) Starter Size

(o) Heater Size, Catalog No. and Amp Rating

(p) Manufacturer of dual-element fuse

(q) Amp rating of fuse

(r) Power Factor

CONTRACTOR'S REPRESENTATIVE:

DATE:

SIGNATURE OF CHECKER:

DATE:

OWNER'S AUTHORIZED REPRESENTATIVE:

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PROGRESS AND RECORD DRAWING CERTIFICATION

NAME OF PROJECT:

DIVISION NUMBER AND NAME:

This is to certify that the attached marked-up design prints were marked as the items were installed at the site during construction, and that these prints represent as accurate "As-Builts" record of the work as actually installed. One copy will be turned over to the Owner at the instruction in Operation Conference. The duplicate copy is for the Engineer's files.

---

Name Of General Contractor

---

BY: Authorized Signature And Title

Date

Name Of Subcontractor

---

BY: Authorized Signature And Title

Date

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SPARE PARTS CERTIFICATION MEMO

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name:

Type of Spare Parts:

Specification Reference:

Quantity of Spare Parts:

Signature below by the contractor signifies that the spare parts required by the drawings and/or specifications have been turned over to the Owner.

---

(Name of General Contractor)

---

(Signature, Title, Date)

---

(Name of Subcontractor)

---

(Signature, Title, Date)

---

(Name of Owner)

---

(Signature, Title, Date)



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VOLTAGE AND AMPERAGE READINGS (TABULATED DATA)

PROJECT NAME: \_\_\_\_\_  
SWITCHGEAR/PANELBOARD

FULL LOAD AMPERAGE READINGS:

DATE \_\_\_\_\_  
TIME \_\_\_\_\_

PHASE A. \_\_\_\_\_  
B. \_\_\_\_\_  
C. \_\_\_\_\_  
N. \_\_\_\_\_  
GROUND \_\_\_\_\_

FULL LOAD VOLTAGE READINGS:

DATE  
TIME

PHASE A TO N \_\_\_\_\_ A TO B  
B TO N \_\_\_\_\_ A TO C  
C TO N \_\_\_\_\_ B TO C

VOLTAGE AT THE END OF THE LONGEST BRANCH

TYPE OF LOAD

NO LOAD VOLTAGE READINGS:

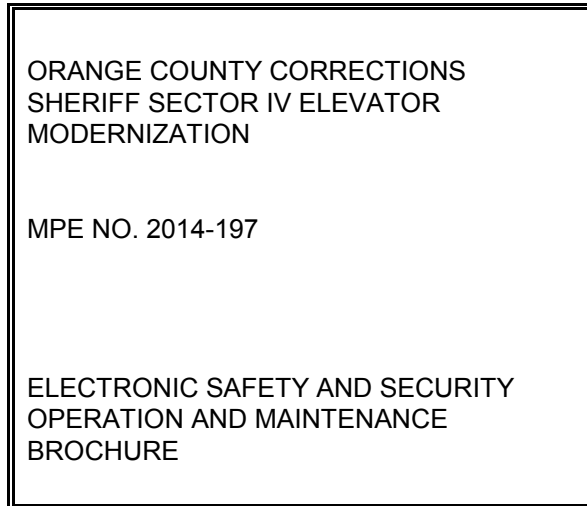
DATE  
TIME

PHASE A TO N \_\_\_\_\_ A TO B  
B TO N \_\_\_\_\_ A TO C  
C TO N \_\_\_\_\_ B TO C

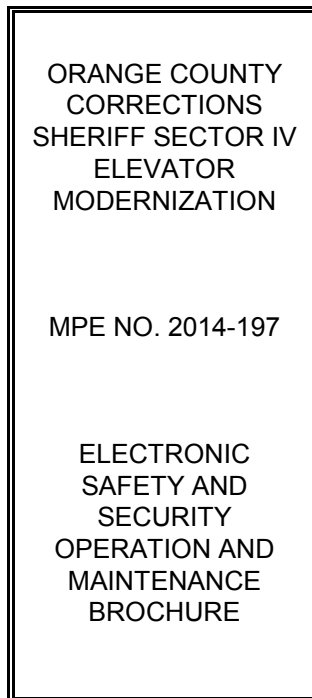
\_\_\_\_\_ ENGINEERS REPRESENTATIVE  
\_\_\_\_\_ OWNER'S AUTHORIZED REPRESENTATIVE  
\_\_\_\_\_ CONTRACTORS REPRESENTATIVE  
\_\_\_\_\_ DATE

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BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder



(Size To 8-1/2" x 11")



(Size To 11")

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SHERIFF SECTOR IV ELEVATOR MODERNIZATION

SECTION 28 01 05 - INVESTIGATION OF EXISTING ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE

- A. Test the essential features of the following existing electrical systems:
  - 1. Fire Alarm as it relates to Elevator replacement.
- B. Each system shall be tested once only, and after completion of testing, results given to the Owner, Engineer and/or Owner's representative. Point out any non-operational function noticed during testing.
- C. Document the existing conditions and operation of the existing electrical systems prior to any work.
- D. Contractor is responsible for all non-working systems and their components unless non-working status is verified prior to work on system.

1.3 TIME

- A. The testing shall be held at a date to be agreed upon in writing by the Owner or his representative.

1.4 ATTENDING PARTIES

- A. The testing shall be held in the presence of the Owner, or his representative and contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PERFORMANCE VERIFICATION

- A. Test the operation of each of the following existing devices and associated systems:
  - 1. Fire Alarm System
    - a) Test each heat detector and record location of each tested device and note either operational or non operational.
    - b) Test each smoke detector with canned smoke and record location of each tested device and note either operational or non operational.
    - c) Test tamper switches by closing the valve until signal is activated and verify trouble signal indication at the fire alarm control panel and annunciators. Record location of each tested device and note either operational or non operational.
    - d) Upon alarm activation verify that the fire alarm zone lights and audible/visual signals function properly. Verify that the local fire department or responding agency receives an automatic signal.
    - e) Upon alarm activation verify that the fire alarm zone lights and audible/visual signals function properly. Verify that the local fire department or responding agency receives an automatic signal.

3.2 MEMO OF INVESTIGATION (TESTING)

- A. Submit Existing Facilities Investigation Memo and advise Owner/Engineer of all deficiencies in system(s) prior to work. All systems will be assumed to be fully operational if memo is not

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received by Engineer prior to work on system.

- B. Submit five (5) copies of memo of tested devices and equipment, memo signed by the Contractor, Subcontractor and Owner and submit each test result to the owner's representative.

END OF SECTION

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EXISTING FACILITIES INVESTIGATION MEMO

NAME OF PROJECT:

The existing systems on the above project have been investigated and checked to determine the existing condition of all existing electrical systems within the area(s) affected by the scope of work of this project. The investigation consisted of testing all electrical systems/devices as required by Section 16061 of these Specifications.

All equipment was found to be operational except as noted herein (list below):

NAME OF PRIME CONTRACTOR:

AUTHORIZED SIGNATURE AND TITLE:

DATE:

NAME OF OWNER'S AUTHORIZED REPRESENTATIVE:

AUTHORIZED SIGNATURE AND TITLE:

DATE:

Note To Contractor: Upon completion of investigation and one week prior to the commencement of work, submit five copies of the completed EXISTING FACILITIES INVESTIGATION MEMO to the Owner's Authorized Representative, signed and dated by the Contractor. Have the Owner's Authorized Representative sign and date receipt of MEMO. Retain copy(ies) and submit copy of MEMO in each Operation and Maintenance Manual. Contractor shall submit quantities of MEMOS as required to present required information.

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GROUND TEST INFORMATION

PROJECT NAME: \_\_\_\_\_

GROUND TYPE: \_\_\_\_\_

TEST BY: \_\_\_\_\_

DATE OF TEST: \_\_\_\_\_

GROUND LOCATION: \_\_\_\_\_

GROUND TYPE (Rod, Water pipe, etc.):

PRIOR TO CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

AFTER CONNECTION TO SYSTEM

GROUND: \_\_\_\_\_ (OHMS)

WEATHER CONDITIONS (Wet/Dry):

SOIL CONDITIONS (Wet/Dry):

CONTRACTOR'S REPRESENTATIVE:

DATE:

ENGINEER'S REPRESENTATIVE:

DATE:

OWNER'S REPRESENTATIVE:

DATE:

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SECTION 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. The requirements in this section of the specification are in addition to all requirements in sections referenced above.

1.2 SUMMARY

- A. This section includes Basic Electronic Safety and Security Requirements specifically applicable to Division 28 Sections, in addition to Division 01 - General Requirements - and any supplemental requirements/conditions.

1.3 DESCRIPTION OF WORK

- A. The work required under this Division shall include all materials, labor and auxiliaries required to install a complete and properly operating electrical system.
- B. The Contractor shall furnish, perform, or provide all labor including planning, purchasing, transporting, storing, installing, testing, cutting and patching, trenching, excavating, backfilling, coordination, field verification, equipment (installation and safety), supplies, and materials necessary for the correct installation of complete electrical systems (as described or implied by these specifications and the applicable drawings) in strict accordance with applicable codes, which may not be repeated in these specifications, but are expected to be common knowledge of qualified Bidders.
- C. The Division 28 Contract Documents refer to work required in addition to (or above) the minimum requirements of the NEC and applicable local codes. All work shall comply with all applicable codes as a minimum and with the additional requirements called for in these Contract Documents.
- D. Only trained and qualified personnel shall be used by the Contractor to perform work. The Contractor shall not perform work, which violates applicable Codes, even if called for in the Contract Documents. The Contractor's Bid shall include work necessary to completely install the electrical systems indicated by the Contract Documents in accordance with applicable Codes.
- E. Refer to other Division 28 Sections for additional work requirements.
- F. Connections of all items using electric power shall be included under this division of the specifications, including necessary wire, conduit, circuit protection, disconnects and accessories. Securing of roughing-in drawings and connection information for equipment involved shall also be included under this division. See other divisions for specifications for electrically operated equipment.

1.4 WORK SEQUENCE

- A. Install work in stages and/or phases to accommodate Owner's occupancy requirements. Coordinate electrical schedule and operations with Owner and Architect/Engineer.

1.5 CODES, FEES, AND STANDARDS

- A. Conform to all applicable requirements of Section Reference Standards and Regulatory Requirements.
- B. Obtain permits and request inspections from authority having jurisdiction and applicable utility companies.
- C. Pay for all required licenses, fees, and inspections.

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- D. Material shall be new and free of defects with UL listing or be listed with an approved, nationally recognized Electrical Testing Agency if and only if UL Listing is not available for material.

1.6 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown or described in the Contract Documents, unless prevented by Project conditions.
- B. The Contractor shall install all equipment so that all Code required and Manufacturer recommended servicing clearances are maintained. Contractor shall be responsible for the proper arrangement and installation of all equipment within any designated space. Should the Contractor determine that a departure from the Contract Documents is necessary, he shall submit to the A/E, for approval, detailed drawings of his proposed changes with his written reasons for the changes. No changes shall be implemented by the Contractor without the issuance of the required drawings, clarifications, and/or change orders.
- C. The Contractor shall verify finish dimensions at the project site in preference to using dimensions noted on Contract Documents.

1.7 INVESTIGATION OF SITE

- A. Check site and existing conditions thoroughly before bidding. Advise A/E of discrepancies or questions noted.
- B. Each Bidder shall visit the site and shall thoroughly familiarize himself with existing field conditions and the proposed work as described or implied by the Contract Documents. During the course of the site visit, the electrical bidder shall verify every aspect of the proposed work and the existing field conditions in the areas of construction and demolition which will affect his work. The Contractor will receive no compensation or reimbursement for additional expenses he incurs due to failure to make a thorough investigation of the existing facilities. This shall include rerouting around existing obstructions.
- C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.
- D. Existing conditions and utilities indicated are taken from existing construction documents, surveys, and field investigations. Unforeseen conditions probably exist and existing conditions shown on drawings may differ from the actual existing installation with the result being that new work may not be field located exactly as shown on the drawings. Contractor shall field verify dimensions of all site utilities, conduit routing, boxes, etc., prior to bidding and include any deviations in the contract. Notify A/E if deviations are found.
- E. All existing electrical is not shown. The Contractor shall become familiar with all existing conditions prior to bidding, and include in his bid the removal of all electrical equipment, wire, conduit, devices, fixtures, etc. that is not being reused, back to it's originating point.
- F. The Contractor shall locate all existing utilities and protect them from damage. The Contractor shall pay for repair or replacement of utilities or other property damaged by operations in conjunction with the completion of this work.
- G. Remove existing power, lighting, systems, material and equipment which are made obsolete or which interfere with the construction of the project. Reinstall power, lighting, systems, materials and equipment which are required to remain active for the facility to be fully functional.
- H. All items removed and not re-used shall be immediately turned over to Owner as they are made available by renovation. Remove items from job site and deliver to Owner's storage location(s) as directed by project manager. Discard complete items which Owner elects to refuse.
- I. Investigate site thoroughly and reroute all conduit and wiring in area of construction in order to maintain continuity of existing circuitry. Existing conduits indicated in Contract Documents



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indicate approximate locations only. Contractor shall verify and coordinate existing site conduits and pipes prior to any excavation on site. Bids shall include hand digging and all required rerouting in areas of existing conduits or pipes.

- J. Work is in connection with existing buildings which must remain in operation while work is being performed. Work shall be in accord with the schedule required by the Contract. Schedule work for a minimum outage to Owner. Notify Owner 72 hours in advance of any shut-down of existing systems. Perform work during non-general office operating hours unless otherwise accepted by Owner. Protect existing buildings and equipment during construction.
- K. Bid shall include all removal and relocation of all piping, fixtures or other items required for completion of alterations and new construction.
- L. See Section Minor Electrical Demolition for Remodeling for additional requirements due to existing conditions.

1.8 CONTRACT DOCUMENTS

- A. These specifications and applicable drawings shall be considered supplementary, one to the other and are considered Contract Documents. All workmanship, methods, and/or material described or implied by one and not described or implied by the other shall be furnished, performed, or otherwise provided just as if it had appeared in both sets of documents.
- B. Where a discrepancy or conflict is found between these specifications and any applicable drawing, the Contractor shall notify the A/E in written form. In the event that a discrepancy exists between specifications and any applicable drawing, the most stringent requirement shall govern unless the discrepancy conflicts with applicable codes wherein the code shall govern. The most stringent requirement shall be that work, product, etc which is the most expensive and costly to implement.
- C. The drawings are diagrammatic and are not intended to include every detail of construction, materials, methods, and equipment. They indicate the result to be achieved by an assemblage of various systems. Coordinate equipment locations with Architectural and Structural drawings. Layout equipment before installation so that all trades may install equipment in spaces available. Coordinate installation in a neat and workmanlike manner.
- D. Wiring arrangements for equipment shown on the drawings are intended to be diagrammatic and do not show all required conductors and functional connections. All wiring and appurtenances required for the proper operation of all equipment to be connected shall be provided.
- E. Specifications require the Contractor to provide shop drawings which shall indicate the fabrication, assembly, installation, and erection of a particular system's components. Drawings that are part of the Contract Documents shall not be considered a substitute for required shop drawings, field installation drawings, Code requirements, or applicable standards.
- F. Locations indicated for outlets, switches, and equipment are approximate and shall be verified by instructions in specifications and notes on the drawings. Where instructions or notes are insufficient to locate the item, notify the A/E.
- G. The Contractor shall take finish dimensions at the project site in preference to scaling dimensions on the drawings.
- H. Where the requirements of another Division, section, or part of these specifications exceed the requirements of this Division those requirements shall govern.

1.9 MATERIALS AND EQUIPMENT

- A. Material shall be new (except where specifically noted, shown or specified as "Reused") and/or denoted as existing) and shall be UL listed and bear UL label. Where no UL label listing is available for a particular product, material shall be listed with an approved, nationally recognized

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Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or exceeds available standards.

- B. Where Contract Documents list design selection or manufacturer, type, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to A/E's review and acceptance. Where Contract Documents list accepted substitutions, these items shall comply with Section Substitutions and requirements.
- C. When a product is specified to be in accordance with a trade association or government standard and at the request of A/E the Contractor shall furnish a certificate that the product complies with the referenced standard and supporting test data to substantiate compliance.
- D. Where multiple items of the same equipment or materials are required, they shall be the product of a single Manufacturer.
- E. Where the Contract Documents require materials and/or equipment installed, pulled, or otherwise worked on, the materials and/or equipment shall be furnished and installed by the Contractor responsible for Divisions 26 27 28 methods and materials unless specifically noted otherwise.
- F. Where the contract documents refer to the terms "furnish," "install," or "provide," or any combination of these terms) the materials and/or equipment shall be supplied and delivered to the project including all labor, unloading, unpacking, assembly, erection, anchoring, protecting supplies and materials necessary for the correct installation of complete system unless specifically noted otherwise.
- G. Before the Contractor orders equipment, the physical size of specified equipment shall be checked to fit spaces allotted on the drawings, with NEC working clearances provided. Internal access for proposed equipment substitutions shall be provided.
- H. Electrical equipment shall be protected from the weather during shipment, storage, and construction per manufacturer's recommendations for storage and protection. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner. No additional time will be allowed and the project completion date shall be maintained.
- I. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair and test damaged equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for the test shall be provided by the Contractor with no additional cost to the Contract.
- J. Material and equipment shall be provided complete and shall function up to the specified capacity/function. Should any material and/or equipment as a part or as a whole fail to meet performance requirements, replacements shall be made to bring performance up to specified requirements. Damages to finish by such replacements, alterations, or repairs shall be restored to prior conditions, at no additional cost to the Owner.
- K. Where the Contract Documents denote equipment and/or material to be 'new' and/or 'existing' and also provide no denotation for other equipment as to it being 'new' and/or 'existing,' this is not to infer that the non-denoted equipment is either new or existing, or opposite of the equipment that is denoted. The use of the terms 'new' or 'existing' is meant to clarify denoted equipment/materials for that item only, and the lack of the terms 'new' or 'existing' in relation to identifiers/notes/denotations on the drawings is not to infer that this non-denoted equipment or materials is new or existing.

1.10 SUPERVISION OF THE WORK

- A. Reference the General Conditions for additional requirements.

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- B. The Contractor shall provide experienced, qualified, and responsible supervision for work. A competent foreman shall be in charge of the work in progress at all times. If, in the judgement of the A/E, the foreman is not performing his duties satisfactorily, the Contractor shall immediately replace him upon receipt of a letter of request from the A/E. Once a satisfactory foreman has been assigned to the work, he shall not be withdrawn by the Contractor without the written consent of the A/E.

1.11 COORDINATION

- A. Provide all required coordination and supervision where work connects to or is affected by work of other trades, and comply with all requirements affecting this Division. Work required under other divisions, specifications or drawings to be performed by this Division shall be coordinated with the Contractor and such work performed at no additional cost to Owner including but not limited to electrical work required for:
  - 1. Elevators
- B. Contractor shall obtain set of contract documents from Owner for all areas of work noted above and include all electrical work in bid whether included in Divisions 26 27 28 Contract Documents or not.
- C. Installation studies shall be made to coordinate the electrical work with other trades. Work shall be preplanned. Unresolved conflicts shall be referred to the A/E prior to installation of the equipment for final resolution.
- D. For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings at 1/4" scale showing the actual physical dimension required for the installation to assure proper integration of equipment with building systems and NEC required clearances. Coordination drawings shall be provided for all areas of conflict as determined by the A/E.
- E. Secure accepted shop drawings from all required disciplines and verify final electrical characteristics before roughing power feeds to any equipment. When electrical data on accepted shop drawings differs from that shown or called for in Construction Documents, make adjustments to the wiring, disconnects, and branch circuit protection to match that required for the equipment installed.
- F. Damage from interference caused by inadequate coordination shall be corrected at no additional cost to the Owner and the contract time for completion will not be extended.

1.12 PROVISION FOR OPENINGS

- A. Locate openings required for work. Provide sleeves, guards or other accepted methods to allow passage of items installed.
- B. Coordinate with roofing Contractor on installation of electrical items which pierce roof. Roof penetrations shall not void roof warranty.
- C. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with Contractor prior to installation.

1.13 SURFACE MOUNTED EQUIPMENT

- A. Surface mounted fixtures, outlets, cabinets, conduit, panels, etc. shall have factory applied finish and/or shall be painted as directed by Engineer. Paint shall be in accordance with other applicable sections of the specifications for this project.

1.14 CUTTING AND PATCHING

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- A. New Construction:
  - 1. Reference Division 01 - General Requirements.
  - 2. Cutting of work in place shall be cut, drilled, patched and refinished by trade responsible for initial installation.
  - 3. The Contractor shall be responsible for backfilling and matching new grades with adjacent undisturbed finished surface.
- B. Existing Construction:
  - 1. See Section Minor Electrical Demolition for Remodeling for additional requirements.

1.15 INSTALLATION

- A. Erect equipment to minimize interferences and delays in execution of the work.
- B. Take care in erection and installation of equipment and materials to avoid marring finishes or surfaces. Any damage shall be repaired or replaced as determined by the A/E at no additional cost to the Owner.
- C. Equipment requiring electrical service shall not be energized or placed in service until A/E is notified and is present or have waived their right to be present in writing. Where equipment to be placed in service involves service or connection from another Contractor or the Owner, the Contractor shall notify the Owner in writing when the equipment will be ready. The Owner shall be notified as far in advance as possible of the date the various items of equipment will be complete.
- D. Equipment supports shall be secured and supported from structural members except as field accepted by the A/E in writing.
- E. Plywood material shall not be used as a backboard for mounting panel boards, disconnects, motor starters, and dry type transformers. Provide "cast in place" type inserts or install expansion type anchor bolts. Electrical equipment shall not be mounted directly to dry wall for support without additional channels as anchors. Channels shall be anchored to the floor and structure above. Panelboards and terminal cabinets shall be provided with structural framing located within drywall partitions.
- F. The Contractor shall keep the construction site clean of waste materials and rubbish at all times. Upon completion of the work, the Contractor shall remove from the site all debris, waste, unused materials, equipment, etc.
- G. Inserts, pipe sleeves, supports, and anchorage of electrical equipment shall be provided. Where items are to be set or embedded in concrete or masonry, the items shall be furnished and a layout made prior to the setting or embedment thereof, so as to cause no delay to the project schedule.

1.16 PROGRESS AND RECORD DRAWINGS

- A. Keep two sets of blueline prints on the job, and neatly mark up design drawings each day as components are installed. Different colored pencils shall be used to differentiate each system of electrical work. Cost of prints and this labor task shall be included under this Division. All items on Progress Drawings shall be shown in actual location installed. Change the equipment schedules to agree with items actually furnished.
- B. Prior to request for substantial completion observation, furnish a set of neatly marked prints showing "as-installed" (as-built) condition of all electrical installed under this Division of the specifications. Marked up prints are to reflect all changes in work including change orders, field directives, addenda from bid set of Contract Documents, request for information responses, etc. Marked up set of prints to show:

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1. All raceways 1-1/2" and above, exactly as installed.
  2. All site raceways exactly as installed.
- C. Where the Contractor has failed to produce representative "as-built" drawings in accordance with requirements specified herein, the Contractor shall reimburse Engineer all costs to produce a set of "as-built" drawings to the Architect/Owner satisfaction.

1.17 "OBSERVATION OF WORK" REPORT

- A. Reference the General Conditions.
- B. Items noted by A/E or his representative during construction and before final acceptance which do not comply with the Contract Documents will be listed in a "Observation of Work" report which will be sent to the Contractor for immediate action. The Contractor shall correct all deficiencies in a prompt concise manner. After completion of the outstanding items, provide a written confirmation report for each item to the A/E. The report shall indicate each item noted, and method of correction. Enter the date on which the item was corrected, and return the signed reports so items can be rechecked. Failure to correct the deficiencies in a prompt concise manner or failure to return the signed reports shall be cause for disallowing request for payments.
- C. Items noted after acceptance during one-year guarantee period shall be checked by the Contractor in the same manner as above. The signed reports are to be returned by him when the items have been corrected.

1.18 SYSTEMS WARRANTY

- A. Reference the General Conditions.
- B. The work shall include a one-year warranty. This warranty shall be by the Contractor to the Owner for any defective workmanship or material which has been furnished at no cost to the Owner for a period of one year from the date of substantial completion of each System. Warranty shall not include lamps in service after one month from date of substantial completion of the System. Explain the provisions of warranty to the Owner at the "Demonstration of Completed System" meeting to be scheduled with the Owner upon project completion.
- C. Where items of equipment or materials carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material.
- D. Where extended warranty or guarantee are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.
- E. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work which shall not alter the Contractor's warranty.

1.19 WASTE MATERIALS DISPOSAL

- A. Contractor shall include in his bid the transport and disposal or recycling of all waste materials generated by this project in accordance with all rules, regulations and guidelines applicable. Contractor shall comply fully with Florida statute 403.7186 regarding mercury containing devices and lamps. Lamps, ballasts and other materials shall be transported and disposed of in accordance with all DEP and EPA guidelines applicable at time of disposal. Contractor shall provide owner with written certification of accepted disposal.

1.20 SUBSTANTIAL COMPLETION

- A. The Contractor shall be fully responsible for contacting all applicable parties Engineer and Orange County Project Manager to schedule required observations of the work by Engineer. A minimum of 72 hours notice shall be given for all required observations of the work by Engineer, and minimum of 120 hours for substantial completion observation. Time and date shall be

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agreed on by all applicable parties in writing.

- B. Work shall be complete as required by authorities having jurisdiction and the general conditions of the contract prior to request for substantial completion observation. Work must be deemed substantially complete by A/E to fulfill requirements.

1.21 PROHIBITION OF ASBESTOS AND PCB

- A. The use of any process involving asbestos or PCB, and the installation of any product, insulation, compound of material containing or incorporating asbestos or PCB, is prohibited. The requirements of this specification for complete and operating electrical systems shall be met without the use of asbestos or PCB.
- B. Prior to the final review field visit, the Contractor shall certify in writing that the equipment and materials installed in this Project under this Division 16 contain no asbestos or PCB's. Additionally, all manufacturers shall provide a statement with their submittal that indicates that their product contains no asbestos or PCB's. This statement shall be signed and dated by a duly authorized agent of the manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

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SECTION 28 05 07 - SUBMITTALS FOR ELECTRONIC SAFETY AND SECURITY

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Requirements for submittals specifically applicable to Division 28 Sections, in addition to Division 01 - General Requirements and any supplemental requirements/conditions.
- B. See Section Substitutions for additional requirements when submittal consists of accepted substitution equipment.

1.3 SUBMITTAL OF "ACCEPTED SUBSTITUTE" EQUIPMENT/PRODUCT

- A. Representation: In submitting item, equipment, product, etc. that has been listed on contract drawings, in contract documents or in an addenda, Contractor represents that he:
  - 1. Has investigated substituted item and has determined that it is equal or superior to specified product in all aspects and that use of substituted item will not require any additional time to the Contract.
  - 2. Will coordinate installation of accepted substitution into work, making changes as may be required to complete work in all aspects.
  - 3. Waives all claims for additional costs related to substitution which may subsequently become apparent.
  - 4. Will provide the same warranties for the substitution as for the product specified.
  - 5. Will absorb all costs incurred by the substitution when affecting other trades including but not limited to electrical, structural, architectural, etc.
  - 6. Will absorb any cost incurred by the Engineer in review of the substituted product if the acceptance of the substituted item creates the need for system modification and/or redesign, or if the substituting contractor exhibits negligence in his substituting procedure thus submitting inferior, misapplied or miss-sized equipment. In the event of additional engineering costs, the billing structure shall be agreed upon prior to review by all involved parties.
- B. Substitutions that cannot meet space requirements or other requirements of these Specifications, whether accepted or not, shall be replaced at the Contractor's expense with no additional time added to the Contract.

1.4 SUBMITTALS

- A. Submittals shall consist of a minimum of one (or if required) two hard cover view type 3-ring binder(s) White, sized to hold 8-1/2" x 11" sheets; one (1) for Electronic Safety and Security.
  - 1. Binder is to be adequately sized to comfortably hold required submittals. Minimum spline size to be 1", maximum spline size to be 3" (provide additional binders if 3" size is not sufficient to properly hold submittals).
  - 2. Binder cover and spline to have outer clear vinyl pockets. Provide correct designation of project in each pocket; see Binder Examples for Submittals included at end of this Section. Description sheet is to be white with black letters, minimum of 11" high and full width of pocket. Description is to describe project and match project drawing/project manual description. Description to include submittal type, i.e., Electronic Safety and Security

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- B. Submittals Binders to include:
1. First sheet shall be prepared and filled out by Contractor and shall list project addresses, telephones, etc.; see "PROJECT ADDRESSES" Form included at end of this section.
  2. Second sheet in binder shall be a photocopy of the Electrical Index pages in Specifications.
  3. Provide reinforced separation sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule.
  4. Submittals consisting of marked catalog sheets or shop drawings shall be inserted in the binder in proper order. Submittal data shall be presented in a clear and thorough manner. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Markings shall be made with arrows or circles (highlighting is not acceptable).
  5. Shop Drawings: Drawings to include identification of project and names of Architect, Engineer, General Contractor, subcontractor and supplier, data, number sequentially and indicate the following:
    - a) Fabrication and erection dimensions.
    - b) Arrangements and sectional views.
    - c) Necessary details, including complete information for making connections with other work.
    - d) Kinds of materials and finishes.
    - e) Descriptive names of equipment.
    - f) Modifications and options to standard equipment required by the work.
    - g) Leave blank area, size approximately 4 by 2 1/2 inches, near title block (for A/E's stamp imprint).
    - h) In order to facilitate review of drawings, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and specification paragraph numbers where items occur in the Contract Documents.
    - i) Conduit/raceway rough-in drawings.
    - j) Items requiring shop drawings include (but not limited to):
      1. Fire Alarm
      2. UL listed fire and smoke stopping assemblies for each applicable penetration
    - k) See specific sections of Specifications for further requirements.
  6. Product Data: Technical data is required for all items as called for in the Specifications regardless if item furnished is as specified.
    - a) Submit technical data verifying that the item submitted complies with the requirements of the Specifications. Technical data shall include manufacturer's name and model number, dimensions, weights, electrical characteristics, and clearances required. Indicate all optional equipment and changes from the standard item as called for in the Specifications. Furnish drawings, or diagrams, dimensioned and in correct scale, covering equipment, showing arrangement of components and overall coordination.
    - b) In order to facilitate review of product data, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and/or



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specification paragraph numbers where and/or what item(s) are used for and where item(s) occur in the contract documents.

- c) See specific sections of Specifications for further requirements.

1.5 PROCESSING SUBMITTALS

- A. Submit under provisions of the General Requirements of the Contract and this section of the Specifications, whichever is the most strict.
- B. Quantity of submittals with marking on each copy shall be submitted under provisions of General Requirements of the Contract, Division 1, and this and other sections of the Specifications. Original submittal must contain 3-ring binders with:
1. Project Addresses
  2. Index
  3. Separation Sheets
  4. Basic Materials
  5. Panelboards
  6. Light Fixtures
  7. Long Lead Items
  8. Systems Product Data
- C. Remainder of submittals are to be submitted no later than 60 days after award of contract or 60 days prior to Request for Substantial Completion whichever is earlier.
- D. The Contractor shall review all submittals before submitting to the A/E. No request for payment will be considered until the submittals have been reviewed and submitted for approval.
- E. Product Data: For standard manufactured materials, products and items, submit one (1) copy or sets of data (per binder). If submittal is rejected, resubmittal shall contain same quantity of new data.
- F. Shop Drawings: For custom fabricated items and systems shop drawings, initially submit a transparency (suitable for reproduction) together with two (2) prints made therefrom. When submittal is acceptable, furnish one (1) print per binder made from the accepted transparency.
- G. Shop Drawing Review Notation.

<u>Action</u>	<u>Description</u>
1. No Exception Noted	No exceptions taken. Resubmittal not required.
2. Rejected	Not in compliance with Contract Documents. Resubmit.
3. Submit Specific Item	Resubmit item as specified.
4. Make Corrections Noted	Make corrections noted, resubmittal not required.
5. Revise and Resubmit	Make corrections noted, resubmittal is required
6. Review not Required	Not required for review. No action taken. Copy retained for reference.

- H. Acceptance: When returned to Contractor, submittals will be marked with A/E's stamp. If box marked "Rejected" "Revise and Resubmit" or "Submit Specific Item" is checked, submittal is not accepted and Contractor is to correct and resubmit as noted, otherwise submittal is accepted and Contractor is to comply with notation making necessary corrections on

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submittal. Review comments will generally not be on each individual submittal sheet, and will be on a separate sheet attached to shop drawing transmittal, submittal as a whole or each submittal section.

- I. Note that the acceptance of shop drawings or other information submitted in accordance with the requirements specified above, does not assure that the Engineer, Architect, or any other Owner's Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved, the ability of the material or equipment involved or the Mechanical/Electrical performance of equipment. Acceptance of shop drawings does not invalidate the plans and Specifications if in conflict, unless a letter requesting such change is submitted and accepted on the Engineer's letterhead.

1.6 DELAYS

- A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.7 RE-SUBMITTALS

- A. The A/E shall be reimbursed for all costs to review resubmittals subsequent to the second submission for the same product. Cost will be billed to Contractor at Engineer's standard hourly rate.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

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PROJECT ADDRESSES

OWNER:

ARCHITECT:

ENGINEER:

Matern Professional Engineering, P.A.  
130 Candace Drive  
Maitland, Florida 32751  
Telephone No.: (407) 740-5020  
Fax No.: (407) 740-0365

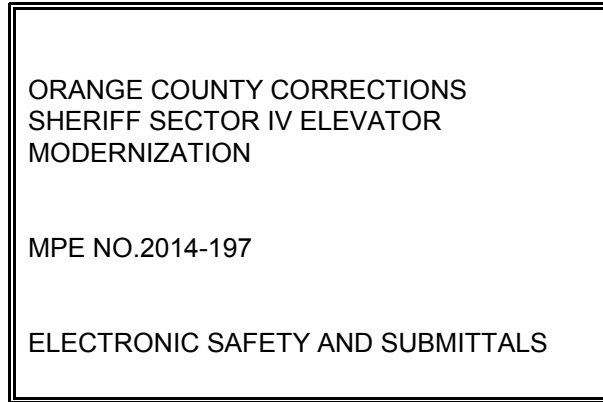
GENERAL CONTRACTOR:

SUBCONTRACTOR:

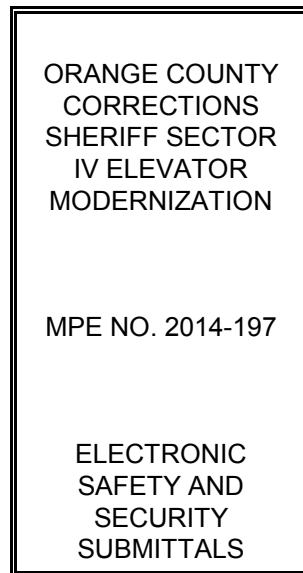
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BINDER EXAMPLES FOR SUBMITTALS  
Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder

Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder



(Size To 8-1/2" x 11")



(Size To 11")

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SECTION 28 31 00 - HARDWARE FIRE ALARM/DETECTION SYSTEM (EXTENSION OF EXISTING)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The work described herein and on the drawings consists of all labor, materials, equipment, and services necessary and required to provide and test an extension of the existing automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on the drawings but required for proper performance and operation shall be provided.
- B. The drawings and specifications herein comply to the best of the engineer's knowledge with all applicable codes at the time of design. However, it is this Contractor's responsibility to coordinate/verify (prior to bid) the requirements of the Authority Having Jurisdiction over this project and bring any discrepancies to the Engineer's attention at least seven days prior to bid. No changes in contract cost will be acceptable, after the bid, for work and/or equipment required to comply with the authority having jurisdiction.
- C. The Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install firestopping where penetrations are made through rated walls and floors.
- D. The Contractor shall provide and install the Fire Alarm system (including all equipment, wiring, etc.) in accordance with the Manufacturer's recommendations.
  - 1. Installation of devices shall be in accordance with the Manufacturer's requirements as well as the requirements of the Contract Documents. Recommendations by the Manufacturer for the proper installation of the Fire Alarm system and its equipment shall not preclude the requirement for the Contractor to comply with the requirements of the Contract Documents.
  - 2. Termination of Fire Alarm circuits shall be in accordance with the Manufacturer's recommendations, applicable requirements of the National Electric Code (NFPA 70), ADA, other applicable Codes and the Contract Documents.
  - 3. Voice evacuation audio circuits (25 or 70V) shall be run in separate raceways from Fire Alarm data loops and other system circuits where the potential exists for interference or adverse effect upon the proper operation of the any Fire Alarm equipment, circuit or the system as a whole.
  - 4. The Fire Alarm Installer shall be responsible for ensuring that prior to bidding the project the Electrical Contractor understands the raceway requirements for the project. Claims by the Contractor after award of the project in regard to additional raceway required either by the Fire Alarm System Manufacturer's recommendations for proper installation of the system and its associated equipment, or for compliance with the requirements of the Contract

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Documents, shall not be allowed.

- E. The Owner The Owner shall be responsible for any retrofits, installation and design required by the local AHJ to comply with the requirements of the Florida Fire Prevention Code 5<sup>th</sup> edition, NFPA 1, Section 11.10. This code requirement can only be determined after the construction of the building and may or may not be required by the local AHJ in the area of this project.

1.3 DESCRIPTION

- A. Provide all materials, work, labor, etc. as required to modify (including any programming, battery capacity, etc.) the existing to comply with the operation, etc. noted in these contract documents.
- B. The system shall include but not be limited to:
  - 1. Main Fire Alarm Control Panel (FACP) including all required power supplies
  - 2. Smoke Detectors
  - 3. Duct Detectors
  - 4. Heat Detectors
  - 5. Remote power supplies (Remote power supplies shall be in a UL Listed assembly and be provided by the same manufacturer as the Fire Alarm Control Panel (FACP)).
  - 6. "Do not use elevator" warning lights.
  - 7. Programming.
  - 8. Grounding
  - 9. Firestopping
  - 10. Wire and cable labeling.
  - 11. Electrical power required to comply with all functions and operations called for in this section of the specifications.
  - 12. Conduit, wire, wire fittings, terminal cabinets with plywood and terminal strips, and all accessories required to provide a complete operating system.
- C. The contractor shall furnish and install all equipment (raceways, wire/cable, circuit breakers, modules, relays, etc.) necessary, and as required by applicable code to accomplish incidental functions of the fire alarm system including but not limited to the following:
  - 1. Elevator recall, control, and/or shutdown.
  - 2. Connection to telephone tie lines, UL listed dialer, etc. required for monitoring of the fire alarm system.
- D. The system shall operate as a non-coded, continuous ringing system which will sound all audible devices and activate all visual devices until it is manually silenced. When system is silenced by silence switch in control panel, audible alarm is to silence but visual alarm devices are to continue to operate.
- E. The system is to be a complete hardwire system.
- F. All portions of fire alarm system shall be installed in conduit. Conduit and boxes to be installed by electrical contractor.
- G. The fire alarm system shall not share a raceway, junction box, enclosure, manhole or device with any other system.
- H. Contractor to advise owner of requirements for monitoring the fire alarm system by owner's monitoring company and provide all electrical required for remote monitoring.

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- I. Provide and install wiring, equipment, etc. for connection to devices furnished under other divisions of the work.
- J. Provide and install wiring, equipment, etc. as required to deactivate power in the elevator rooms by heat detectors via shunt trip breakers and arm sprinkler pre-action system.
- K. Provide wiring for Post Indicator Valve Alarms, in each instance in which these are provided under work of Other Trades, connected to Fire Alarm System.
- L. Provide and install all relays (electric-electric, electric-pneumatic, and/or pneumatic-electric) as required for a complete and operational fire alarm system, complying with all applicable codes and all requirements, and coordinated with all divisions of these specifications.
- M. Provide terminal cabinets sized to house terminal strips and surge suppression equipment

1.4 STANDARDS, CODES, REFERENCES, AND REGULATORY REQUIREMENTS

- A. Reference Section Reference Standards and Regulatory Requirements.
- B. The equipment and installation shall comply with the current or applicable provisions of the following standards:
  - 1. ANSI S3.41 American National Standard Audible Emergency Evacuation Signal
  - 2. National Fire Protection Association Standards:
    - a) NFPA 70 National Electrical Code (including but not limited to Article 760, Fire Alarm Systems)
    - b) NFPA 72 National Fire Alarm Code
    - c) NFPA 101 Code For Safety to Life from Fire in Buildings and Structures
  - 3. Underwriters Laboratories Inc. The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:
    - a) UL 864 (Category UOJZ) APOU Control Units for Fire Protective Signaling Systems. All Control Equipment shall be listed under UL category UOJZ.
    - b) UL 268 Smoke Detectors for Fire Protective Signaling Systems
    - c) UL 268A Smoke Detectors for Duct Applications
    - d) UL 217 Smoke Detectors Single Station
    - e) UL 521 Heat Detectors for Fire Protective Signaling Systems
    - f) UL 228 Door Holders for Fire Protective Signaling Systems
    - g) UL 464 Audible Signaling Appliances
    - h) UL 1638 Visual Signaling Appliances
    - i) UL 1481 Power Supplies for Fire Protective Signaling Systems
    - j) UL 1480 Speakers
    - k) UL 1424 Cables
    - l) UL 1971 Signaling Devices for the Hearing Impaired
    - m) UL 1449 3<sup>rd</sup> Edition Standard for Safety for Surge Protective Devices
    - n) UL 497, UL 497A, UL 497B.
  - 4. All fire alarm equipment, including accessories to the system and including all wires and cable unless otherwise noted, shall be listed by the Underwriters Laboratories product

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directory called Fire Protection Equipment and/or the Electrical Construction Materials List.

5. Each item of the fire alarm system shall be listed and classified by UL and FM as suitable for purpose specified and indicated.
  6. The system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC 760.
  7. All equipment supplied as part of the Fire Alarm System shall be provided by a single manufacturer and shall comprise a complete UL Listed Fire Alarm System.
  8. IEEE: The fire alarm system includes solid state electronic components. Therefore, the equipment manufacturer shall provide certification that all such equipment is internally protected from, or can withstand, power line surge voltages and currents as specified in Table 1, Location Category A High Exposure of ANSI/IEEE Standard C62.41-1980 (formerly IEEE Standard 587).
- C. The equipment and installation shall comply with the current or applicable provisions of the following codes and laws:
1. Americans with Disabilities Act (ADA): The fire alarm system shall comply with ADA, Public Law 101-336, 1990. The system shall comply with ADA Standards for Accessible Design, 2010.
  2. Federal Register - Rules and Regulations - Non-discrimination on the basis of Disability by Public Accommodations and in Commercial Facilities.
  3. ASME/ANSI A17.1 - Elevator Code
  4. Local and State Building Codes.
    - a) Florida Building Code, 5<sup>th</sup>
    - b) Florida Administrative Code. All applicable chapters including but not limited to:
      1. Chapter 69A Rules, including but not limited to:
        - (a) Ch 69A-3 Fire Prevention - General Provisions.
        - (b) Ch 69A-46 Fire Protection System Contractors and Systems.
        - (c) Ch 69A-47 Uniform Fire Safety Standards for Elevators.
        - (d) Ch 69A-48 Fire Safety Standards for the Fire Alarm Systems.
    - c) Florida Department of Insurance:
      1. Insurance Code: The fire alarm system and installation thereof shall comply with the State of Florida Department of Insurance rules. The requirements of the Florida State Department of Insurance shall be as promulgated by the Division of State Fire Marshal.
      2. Fire Alarm Rules: The fire alarm system and installation thereof shall comply with the Fire Safety Rules promulgated by the Florida State Fire Marshal.
    - d) Authority Having Jurisdiction:
      1. General: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local authority having jurisdiction.
      2. Fire Department.....
      3. Building Official.....
      4. State of Florida: Division of State Fire Marshal.



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1.5 RELATED SECTIONS

A. Applicable sections of these specifications with regard to, but not limited to:

1. Elevators

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten (10) years experience and with service facilities within 50 miles of Project.

B. Installer:

1. Company specializing in installing the products specified in this section with minimum ten (10) years experience.
2. The Installer shall be currently licensed by the Electrical Contractors' Licensing Board as a Certified Alarm System Contractor I (EF).
3. The installing Contractor shall be a direct sales division of, or the authorized and designated distributor for, a fire alarm system manufacturer.
4. Installing Contractor shall maintain a local staff of specialists, including a Fire Alarm Planning Superintendent, for planning, installation, and service.
5. The installing Contractor shall maintain an office within fifty (50) miles of the project with capability to provide emergency service 7-days-a-week, 24 hour days. The installing Contractor shall have been actively engaged in the business of selling, installing and servicing fire alarm systems for at least ten (10) consecutive years going back from date of bid.

C. Coordination/Project Conditions

1. Verify proper grounding is in place.
2. In installations where the electrical contractor does not provide a counterpoise system in conjunction with the underground raceway system, the fire alarm contractor shall provide a coupling conductor within the fire alarm underground raceway system to run along side fire alarm conductors. Coupling conductors shall be sized according to applicable codes and standards.

D. The work specified herein is an extension of the existing system and as such all equipment shall match existing. In the event that the existing equipment is no longer available other equipment will be considered for acceptance provided the following is submitted in writing by the system installer to the engineer (See Section Common Work Results on Substitutions):

1. Certified letter from the manufacturer specifically stating the following:
  - a) Part numbers and descriptions of each item that is no longer manufactured.
  - b) Manufacturer name (if not the same as the original manufacturer), part numbers and descriptions of items that are certified by the manufacturer to be compatible with the existing system.
  - c) A detailed listing of specific differences, including both advantages and disadvantages, between the original item and the proposed substitution.
2. Contractor qualifications (as listed above).
3. Complete lists, descriptions and drawings of materials to be used.
4. A complete drawing showing conduit, conduit sizes, backboxes, number of wires and wire sizes.
5. A complete riser diagram of Fire Alarm System.

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1.7 SUBMITTALS

- A. Submit in accordance with Section Common Work Results and Section Submittals.
- B. In addition to requirements above, the contractor shall submit:
  - 1. Narrative of operation of System as provided. (Submittal will not be reviewed by the A/E without this narrative.)
  - 2. Manufacturer's data on all products, including but not limited to:
    - a) Catalog cut sheets.
    - b) Roughing-in diagrams.
    - c) Installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
    - d) Operation and maintenance manuals.
    - e) Typical wiring diagrams and risers.
    - f) The contractor shall submit test reports, manufacturers' specifications and any other information necessary to determine compliance with material and equipment specifications described herein.
  - 3. Submit floor plans to locate all devices. Wiring diagrams shall include wire and raceway sizes, fire alarm control panels, riser wiring and associated raceway sizes, wiring details, connections and terminal identification. All devices shall be identified by the same applied identification symbol as shown on the contract documents.
  - 4. Submit all load calculations and cable/wire sizing for each branch of the individual fire alarm field circuits. Wire sizing calculations to prove maximum three percent (3%) voltage drop at all AC voltages and maximum eight percent (8%) voltage drop at all DC voltages.
  - 5. Battery sizing calculations.
  - 6. Submit a detailed step by step testing procedure for a component by component system functional checkout and test.
  - 7. Point to point wiring diagrams and block diagrams of system to be installed. Point to point wiring diagrams may be submitted at time of operation and maintenance manuals in lieu of in submittal brochure. Block diagrams shall be required with submittals.
  - 8. Riser diagrams and floor plans showing conduit runs and number of wires. All devices shall be identified by the same applied identification symbol as shown on the drawings.
  - 9. Surge Suppression
    - a) Surge protective data for 120 volt power source, power circuit, outside signaling circuit, and exterior incoming circuits from other buildings (if any), and outgoing circuits to other buildings (if any).
    - b) Submit Product Data for each type of suppressor:
      - 1. Dimensions.
      - 2. Means of mounting.
      - 3. Compliance with UL Standards referenced.
      - 4. Compliance with IEEE Standards referenced.
      - 5. Design type (Hybrid, MOV).

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6. Size of wire leads.
  7. Warrantee.
  8. Performance data showing compliance with performance as specified herein.
  9. Complete schematic data on each suppressor type indicating component values, part number, conductor sizes, etc.
  10. Manufacturer's certified test data on each suppressor type.
  11. Test data from an independent test laboratory.
10. Name, qualifications, etc. of company providing and installing system.
  11. Qualifications of installer. Submit proof installer meets specified requirements.
  12. Proof of UL Listing. Indicate the UL listing, the UL classification, and NEC insulation type used for each type of wire to be used in installation of fire alarm and communications system.
  13. Manufacturer's drawings showing all dimensions (height, width, and depth) for all cabinets used to house system components. Provide catalog pages, mounting details and specification sheets for all fire alarm system components and rough-in boxes.
  14. Submit Florida Registered Firm certificate number.
  15. Submit Florida Fire Alarm Contractor's license number.
  16. Submit Fire Alarm Technician(s) Manufacturer's certification.

1.8 PROJECT RECORD DOCUMENTS

- A. Submit in accordance with Section Common Work Results and Section Operation and Maintenance Manuals..
- B. In addition, the contractor shall submit:
  1. Updated and revised contract documents to record actual locations (as-installed) of all equipment, devices, initiating devices, signaling appliances, and end-of-line devices.
  2. Record actual type, size, and routing of cables installed.
  3. Record all cable identifications.
  4. Drawings required herein are in addition to those required under "OPERATION AND MAINTENANCE DATA".
  5. All drawings required herein to be on Autocad 2007.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit in accordance with Section Common Work Results and Section Operation and Maintenance Manuals.
- B. In addition to the requirements above, the contractor's O & M Manuals shall include:
  1. A complete as-installed equipment list, listed by room, with manufacturers' names, model numbers, serial numbers, and quantities of each item.
  2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and codings (point-to-point wiring diagrams). System performance measurements shall be documented as noted elsewhere in this specification.
  3. Riser diagrams showing as-installed conduit with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit.

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4. Repair parts list for each and every major equipment item furnished.
5. Service manuals for each and every major equipment item furnished.
6. Manufacturer's warranties and operating instructions for each and every equipment item furnished. Include a copy of the certificate of warranty, signed by both parties.
7. Technical Systems Operations Manual, custom-written by the Contractor, for the purpose of instructing the Owner's operating personnel in the detailed step-by-step operation of the system and preventive maintenance procedures. This manual shall include descriptions of the system components and their relationship to system function. This manual shall be bound separately and labeled appropriately.

1.10 WARRANTY

- A. The contractor shall warrant the equipment to be new and free from defects in material and workmanship, and will, within one year from date of acceptance by owner, repair or replace any equipment found to be defective.
  1. No charges shall be made by the installer for any labor, equipment, or transportation during this period to maintain functions.
  2. Respond to trouble call within twenty-four (24) hours after receipt of such a call.
- B. The contractor shall guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of final acceptance of the system.
- C. Surge Suppression
  1. All surge suppression devices shall be warranted to be free from defects in materials and workmanship for a period of five (5) years.
  2. Any suppressor which shows evidence of failure or incorrect operation during the warranty period shall be repaired or replaced by the manufacturer and installer at no cost to the owner.

1.11 OWNER'S INSTRUCTION

- A. Provide instruction to the Owner's designated personnel upon completion of the system installation. Instruction shall include a functional training session on fire alarm control panel operation and instruction on peripheral device operation, including what are normal indications and alarm indications of each type of new/added device. Videotape all training sessions and deliver four copies of tapes to Owner (for use in future training).

1.12 SYSTEM OPERATION

- A. System operation shall meet the operation requirements of all codes and regulatory requirements.
- B. System operation shall meet the operation requirements of all codes and regulatory requirements.
- C. Upon activation of the Fire Alarm System by any smoke detector, any sprinkler flow alarm switch or other automatic detection device, the following shall take place in addition to the above:
  1. Shut down all air handlers and exhaust fans supplying or exhausting air in at least the zone where the alarm is initiated.
  2. Shut all smoke dampers in ducts associated with the air handling units and exhaust fans which are shut down, in at least the zone where the alarm is initiated. (Coordinate with mechanical contractor and provide all electrical as required).
  3. Transmit signals to building elevator control panel to initiate return to main floor or alternate floor.

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4. Transmit signals to building automation system to tell system that the fire alarm system has taken control of respective mechanical system.
  5. Send a signal to all dimming and lighting relay/control systems. Fire alarm signal shall initiate dimming system controls to drive all dimmed circuits to immediate full-on output. Fire alarm signal shall initiate lighting relay/control system to turn on all emergency lighting circuits.
  6. Send a signal to all non-fire alarm sound reinforcement systems. Fire alarm signals shall override all other sound systems. Alarm notification signals shall take precedence over all other signals. Operation of other sound systems shall resume after fire alarm system clears alarm.
- D. Elevator: Smoke detectors associated with elevator lobbies, hoistways and machine rooms shall be types accepted by the Florida State Fire Marshall under F.A.C. Chapter 4A-47 Uniform Fire Safety Standards for Elevators. Elevator recall shall be initiated ONLY by elevator lobby, hoistways and machine room smoke detectors. In addition to those functions outlined in "A" above, elevator detector(s) shall initiate the following functions.
1. The operation of any one Elevator Lobby or Hoistway Product of Combustion Detectors associated with a single bank of elevators shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures, floor(s) of recall, and alternate floor(s) of recall.
  2. The operation of any elevator machine room Product of Combustion Detector that is part of this Fire Alarm System shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures.
  3. The activation of the smoke detector(s) in a machine room or hoistway shall cause a suitable warning light to flash. The light is to be located adjacent to the "Phase One" recall switch or elevator hall button at the designated and alternate fire department access level.
  4. fire alarm system shall monitor shunt trip voltage per NFPA 72.

PART 2- PRODUCTS

2.1 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

- A. All equipment shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on the contract drawings shall be the best suited for the intended use and shall be provided by a single manufacturer.
- B. Provide all equipment to match existing equipment required to perform all functions and/or features included in this section of the specifications even though not specifically noted or specified herein.
- C. Modify/rework existing system as required for extension to new devices and/or as required for proper operation of system with new devices, adding new zone modules, adding surge suppression, adding power supply and battery capacity to meet regulatory requirements with new devices, etc.

2.2 RACEWAYS

- A. General:
  1. All raceways (conduit, wireways, pullboxes, outlet boxes, etc.) shall comply with applicable requirements of sections within Divisions 26, 27, 28 of these specifications.
  2. All raceways (conduit, wireways, pull boxes, outlet boxes, etc.) shall comply with all requirements of the manufacturer of the fire alarm system.

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- B. Conduit: Comply with Section Conduit except as noted below:
  - 1. Pull Cords: Install pull cords in all raceway runs that are installed without cable.
  - 2. Size: Minimum size shall be 3/4" conduit.
- C. Boxes:
  - 1. All outlet boxes, junction boxes, pull boxes, etc. shall comply with applicable section of these specifications.
  - 2. Boxes shall be sized as required by the fire alarm system manufacturer and NEC for cables and/or device installed.

2.3 TERMINATION CABINETS

- A. Terminal cabinets are to comply with applicable sections of these specifications.

2.4 "SYSTEMS" AND "LOCAL" GROUND BUS

- A. Bus to comply with applicable sections of these specifications.
- B. Control Relay Module
  - 1. The Control Relay Module shall provide four sets for Form C contacts rated at 5A, 28 VDC. These relays may be programmed to activate on alarm from any initiating zone or any combination of initiating zones.
  - 2. An expansion printed circuit board shall be provided for this module to extend its capability to 8 such control relays.
  - 3. The module shall provide eight red ON/OFF LEDs and 8 yellow TROUBLE (indicates disabled status) LEDs. It shall also provide a momentary switch per relay that may be used to manually turn the relay ON/OFF, to disable the relay, or to program the relay. Custom label inserts shall be provided that may be used to identify the relays with up to 30 characters of information each by use of a standard typewriter.
  - 4. The module shall be provided with plugable contact wiring terminal strips for ease of installation and service. The terminal strips shall be UL listed for 12 AWG wiring.
- C. Auxiliary Relay Module
  - 1. The Auxiliary Relay Module shall provide four sets of Form C relay contacts rated at 20A, 28 VDC or 120 VAC. These relays may be connected to any Indicating Circuit Module or Control Relay Module and will track the relays on that module.
- D. Control panel shall include all equipment required to alert fire department and/or owner's monitoring service.

2.5 PHOTOELECTRIC SMOKE DETECTOR

- A. The contractor shall furnish and install, where indicated on the plans, photoelectric smoke detectors. The combination detector head and twist-lock base shall be UL-listed compatible with a UL-listed fire alarm panel.
- B. The base shall be directly interchangeable with ionization detector.
- C. The smoke detector shall have a flashing, status-indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. The detector may be reset by actuating the control panel reset switch.
- D. The sensitivity of the detector shall be monitored without removal of the detector head. Metering test points shall be accessible on the exterior of the detector head. Field adjustment of the sensitivity shall be possible when conditions require a change.

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- E. The vandal-resistant, security locking feature shall be used in those areas as indicated on the drawings. The locking feature shall be field removable when not required.
- F. It shall be possible to perform a functional test of the detector without the need of generating smoke. The test method must simulate effects of products of combustion in the chamber to ensure testing of all detector circuits.
- G. To facilitate installation, the detector shall be nonpolarized. By using a furnished wire jumper, it shall be possible to check circuit loop continuity prior to installing the detector head.
- H. Voltage and RF transient suppression techniques shall be employed to minimize false alarm potential. A gated alarm output shall be used for additional detector stability.

2.6 HEAT DETECTORS

- A. Rate-of-Rise automatic heat detectors shall be the combination rate-of-rise and fixed temperature type - rated at 135 F. for areas where ambient temperatures do not exceed 100 F. and rated at 200 F. for areas where ambient temperatures exceed 100 F. but not 150 F. The rate of rise element shall consist of an air chamber, a flexible metal diaphragm, and a factory-calibrated moistureproof, trouble-free vent and shall operate when the rate of temperature rise exceeds 15 F. per minute. The fixed temperature element shall consist of a heat collector held by standard sprinkler fusible solder. Detectors shall have a smooth ceiling rating of 2500 square feet and an electrical contact ratings of 3 amps at 6 to 125 volts A.C. and 1 amp at 6 to 28 volts D.C. (Fixed temperature detectors shall have the same temperature and electrical ratings as combination thermostats but a smooth ceiling rating of 625 square feet.) Detectors shall be installed in accordance with appropriate articles of National Fire Protection Association and the spacing rating assigned by the Underwriters Laboratories and located as shown on the drawings. Automatic heat detectors shall be Underwriters Laboratories Listed and Factory Mutual accepted.
- B. Fixed temperature automatic heat detectors shall be rated at 135°F. The fixed temperature element shall consist of a heat collector held by standard sprinkler fusible solder. Detectors shall have a smooth ceiling rating of 625 square feet and 2 Form 'A' contacts with rating of 3 amps at 6 to 125 volts A.C. and 1 amp at 6 to 28 volts D.C. Detectors shall be installed in accordance with appropriate articles of National Fire Protection Association and the spacing rating assigned by the Underwriters Laboratories and located as shown on the drawings. Automatic heat detectors shall be Underwriter's Laboratories and Factory Mutual accepted.
- C. Where indicated on the drawings the contractor shall provide heat detectors rated, by the manufacturer, as explosion proof.

2.7 RELAYS

- A. Relays required for control (i.e. Air Handler shutdown, Supply Fan shutdown, Exhaust Fan shutdown, Fan Terminal Box shutdown, Door Lock release, Fire Shutter release, Smoke Damper closure, Fire Damper closure, Smoke/Fire Damper closure, or any other interface required by these specifications or applicable codes) shall be UL Listed relays suitable for use in Fire Alarm systems.
- B. Per NFPA, relays used for control of other systems shall be located within three feet (3') of the device to be controlled.
- C. Relays shall be controlled from the fire alarm system.
- D. Each relay shall provide at least one set of Form "C" dry relay contacts.

2.8 ELEVATOR WARNING LIGHT WITH FLASHER

- A. Provide complete, indicating light with flasher per F.A.C. 4A-47. Install label as required.
- B. Initiation Devices:

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1. Plug-in replacement modular design with associated female wiring connector.
  2. UL 497B listed and labeled.
  3. Multi-stage hybrid protection circuit.
  4. Fail short/fail safe.
  5. Surge Capacity: 10KA with 8 x 20  $\mu$ s waveform, 500A per line with 10 x 700  $\mu$ s waveform.
  6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700  $\mu$ s waveform.
  7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
  8. Capacitance: 1500 pf.
  9. Manufacturer:
    - a) EDCO #PC642C series with #PCBIB base.
- C. Data Loops:
1. Plug-in replacement modular design with associated female wiring connector.
  2. UL 497B listed and labeled.
  3. Multi-stage hybrid protection circuit.
  4. Fail short/fail safe.
  5. Surge Capacity: 10KA with 8 x 20  $\mu$ s waveform, 500A per line with 10 x 700  $\mu$ s waveform.
  6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700  $\mu$ s waveform.
  7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
  8. Capacitance: 50 pf.
  9. Manufacturer:
    - a) EDCO #PC642C-LC series with #PCBIB base.
- D. Terminations
1. Provide terminals sized for circuits required on project.
  2. Where surge suppression modules are for mounting on 'M' block assembly, provide M block assembly complete with grounding system that mates with surge suppression equipment.
- E. Terminal Cabinets
1. Provide terminal cabinets for all terminations and surge suppression equipment including 120VAC power surge suppressor as required in Section Surge Suppression Equipment. Size terminal cabinets as required to facilitate installation of terminations and surge suppression in a neat and workmanlike manner.
  2. Terminal cabinet to meet specifications in Section Cabinets and Enclosures unless specifically manufactured for use.
  3. Manufacturers:
    - a) Interior.
      1. Square "D"
      2. Hoffman



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3. BUD
- b) Exterior.
  1. Hoffman
  2. BUD
  3. Carlon

2.9 CABLE

- A. Contractor shall provide and install cable as required by the manufacturer, as specified elsewhere in these specifications, and to provide a complete, fully operational, UL listed Fire Alarm system.
- B. Fire alarm system cables installed in exterior and/or underground raceways shall comply with the applicable sections of NEC 760.

2.10 WATERFLOW DETECTOR

- A. Waterflow switch to be supplied and installed by the mechanical contractor and wired in to Fire Alarm System by systems contractor. Zone as shown on zone schedule.

2.11 SPRINKLER SUPERVISORY SWITCHES

- A. Supervisory Switch to be supplied and installed by mechanical contractor and wired in to Fire Alarm System by systems contractor. Zone as shown on zone schedule.

2.12 PRESSURIZATION

- A. Upon alarm from the Fire Alarm System, the Fire Alarm Control Panel shall activate pressurization fans for both stairwells and the elevator shaft. Systems contractor shall provide control relay, 24 Vdc coil, one per fan, to accomplish this action. Smoke dampers on the roof shall be closed in order for pressurization to be accomplished.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install firestopping where penetrations are made through rated walls and floors.
- B. Locate, install, and test fire alarm and detection systems in accordance with the equipment manufacturer's written instructions, and the latest editions of the National Electric Code, the National Electrical Contractor's Association publication "Standard of Installation" and all applicable codes and standards referenced in this specification.
- C. Provide all work required for a complete system including complete system testing and checkout. All components shall be properly mounted and wired. The installation of this system shall comply with the directions and recommendations of authorized factory representatives.

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- D. Provide wiring, cabling, raceways, and electrical boxes in accordance with manufacturer's written instructions.
- E. Components shall be electrically "burned-in" by operating the component at full power for a period as recommended by the manufacturer.
- F. Installation shall be done in a neat workmanlike fashion by a firm regularly engaged in Fire Alarm Installation and Service.
- G. The installation and inspection of all fire detection and fire alarm devices and systems shall be performed by, or under the direct on-site supervision of, a licensed fire alarm technician or a fire alarm planning superintendent who shall certify the work upon completion of the activity. The certifying licensee shall be present for the final test prior to certification.
- H. As-built plans and wiring diagrams shall bear the signature and license number of the licensed fire alarm planning superintendent, the date of installation and the name, address, and certificate-of-registration number of the registered firm.
- I. Installation of detectors:
  - 1. All ceiling mounted detectors shall be installed in accordance with the requirements of NFPA 72.
  - 2. All concealed detectors shall be provided with a remote indicating lamp and test switch installed in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.
  - 3. Duct detectors shall be installed in accordance with NFPA 90A. All brackets and hardware shall be provided as required to install detector housing in correct position. All detector housings shall be sealed as required to prevent air leakage between duct and housing. Sampling tubes of proper length shall be provided and installed to match duct width at the installed location.

3.2 RACEWAYS AND BOXES

- A. Provide dedicated raceway with applicable boxes for all fire alarm wiring in accordance with applicable sections of these specifications.
- B. All initiating, indicating and auxiliary control devices shall be mounted on UL listed outlet boxes.
- C. Provide supporting devices per Section Hangers and Supports.
- D. Identify raceways and boxes per Section Electrical Identification.

3.3 WIRE/CABLE

- A. Conductor: 98% conductivity, solid copper or stranded copper . If stranded conductors are used, then a compression lug shall be installed at every end. Wrapping twisted strands at terminal block screw is not acceptable. As an acceptable equivalent, stranded conductors without crimp-on lugs may be terminated into terminal strips of box-lug connectors.
- B. Insulation: A type accepted by NEC for the application. Individual conductors shall be Type THHN/THWN. All cable shall be UL listed for fire-protective signaling application. Communication, Class 3 or Multi-Purpose cables shall not be substituted for FP cable types.
- C. Size: All conductors shall be sized as prescribed by the system manufacturer, with following minimums:
  - 1. Multiplex Signaling Line Circuit: AWG #14, shielded twisted pair cable.
  - 2. Initiating Circuits, Hard-Wired Devices: AWG #14, THHN/THWN conductors.
  - 3. Notification Appliance Circuits: AWG #14, THHN/THWN conductors.

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4. Initiating Circuits, Addressable Devices: AWG #14, shielded twisted pair cable.
  5. Provide larger conductors where required to maintain voltage drop or signal strength within acceptable limits.
  6. The above wire sizes shall be increased to size as required to comply with authority having jurisdiction or as required for voltage drop, load, etc.
- D. Color Coded:
1. Wiring shall be color coded as required to match existing system.
  2. Permanent wire materials shall be used to identify all splices and terminations for each circuit at all junction boxes, outlet boxes, and terminations.
- E. UL:
1. General: Fire-protective signaling cable shall be UL listed as non-power limited or power limited as needed to match the output of the fire alarm equipment.
  2. Non-Power Limited: Fire protective signaling circuits classified as non-power limited shall use cable listed under UL Electrical Construction Materials Directory. Category HNHT, "NON-POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". all such cable shall have fire resistance, listing and markings as described in NEC 760.176. Minimum cable marking shall be NPLF.
  3. Power Limited: Fire protective signaling circuits classified as power limited shall use cable listed under UL Category HNIR, "POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". All such circuits shall be durably marked where plainly visible at terminations to indicate that it is a power-limited fire protective signaling circuit. Refer to paragraph titled "Fire Resistance of Cables" for additional requirements.
  4. Fire Resistance of Cables: Power-limited fire-protective signaling circuit cables shall be UL listed as described in NEC 760.179. All such cable shall bear a cable marking that includes a Type designation as given in NEC Table 760.179(I). Provide Type FPL.
- F. Connections of Installation Wiring:
1. Connections to Equipment: In accordance with NFPA for monitoring integrity and with the equipment manufacturer's instructions.
  2. Connections of installation wiring to alarm initiating devices and alarm indicating appliances shall be monitored for integrity.
  3. Interconnecting means shall be arranged so that a single break or single ground fault will not cause an alarm signal.
  4. Apply a compression lug, similar to T&B Sta-Kon Terminal, to all stranded conductors at terminations or use box-lug terminal strips.
  5. There shall be no wire splices. All wiring shall be continuous, uncut between devices and terminal blocks.
- G. Rated Enclosures:
1. All vertical fire alarm wiring traversing more than one level shall be routed in rated enclosures. In addition, all horizontal wiring serving devices location on floors other than where wiring originates shall be routed in 2-inch concrete encasement, suitable rated building construction, or 2-hour wrap application enclosure accepted by local authority having jurisdiction.
- 3.4 END-OF-LINE DEVICE
- A. Mount end-of-line device box with last device or separate box adjacent to last device in circuit.

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3.5 AUXILIARY CONTROL RELAYS

- A. An auxiliary fire alarm relay used to control an emergency control device, e.g. motor controller for HVAC system fan or elevator controller shall be located within 3' of the emergency control device.
- B. The installation wiring between the system panel and the auxiliary fire alarm relay shall be monitored for integrity.
- C. Auxiliary control relays shall be listed for use with fire alarm systems.

3.6 ELEVATORS

- A. Operation of elevators under fire or other emergency conditions - elevators having a travel distance of 25 feet or more shall conform to the requirements of ANSI A17.1, Safety Code for Elevators and Escalators, Rule 2.27.3, as incorporated herein by reference.
- B. When an automatic sprinkler system is required to be installed throughout a building for complete fire protection coverage, the provisions of ANSI A17.1, Rule 2.8.2, which is incorporated herein by reference, shall be applicable. When an automatic sprinkler system is required to be installed, the automatic sprinkler system shall be a pre-action sprinkler system and the pre-action sprinkler shall be installed in the elevator machine room and elevator hoistway. An accepted fixed temperature (135 degrees F.) heat detector shall be installed in the elevator machine room, elevator pit, and elevator hoistway as an integral part of the pre-action sprinkler system to automatically disconnect the main power supply to the affected elevator(s) prior to the application of water. The main power supply shall not be self-resetting. The activation of sprinklers outside of the hoistway or machine room shall not disconnect the main power supply. The sprinkler head located in the elevator machine room and elevator hoistway shall have an activation temperature greater than the accepted fixed temperature heat detector.
- C. In addition to the requirements of ANSI A17.1, Rule 2.27.3.2.1, an accepted smoke detector(s) shall be installed in the elevator hoistway, and the machine room meeting the requirements of Rule 69A-47.008. The activation of the smoke detector(s) in the machine room or the elevator hoistway shall cause a suitable warning light to flash. The light is to be located adjacent to the "phase one" recall switch required by ANSI A17.1 Rule 2.27.3.1 or elevator hall button. The warning light shall be red, and a minimum diameter of 1/8 inch. A sign shall be incorporated with or adjacent to the light and contain the following wording "DO NOT USE ELEVATOR". The minimum size for the letters on the sign shall be 1/8 inch. Provide supervised fire alarm system wiring and power to elevator warning lights. Lights shall function per elevator bank. Provide and install light at first floor and alternate floor as directed by authority having jurisdiction.
- D. Provide detectors with auxiliary relay complete with tie into elevator controller as required by all codes, or provide separate zone.

3.7 CABLE IDENTIFICATION

- A. Provide and install permanent cable markers on all cables/wire lines, telephone lines, etc. at terminal strips, terminal cabinets and at main equipment.

3.8 EXISTING CONDITIONS

- A. Existing fire alarm control panel and all associated electrical is to be removed, complete.
- B. All existing fire alarm wiring and conduit is to be removed complete.
- C. Contractor shall investigate existing conditions prior to bid.

3.9 CONDUIT/BOX IDENTIFICATION

- A. Contractor shall identify fire alarm conduit and boxes with red paint in exposed locations. Identify conduit in concealed locations with 4" mark of red paint every 4'-0" O.C.

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3.10 DEMONSTRATION

- A. When system is complete it shall be demonstrated to owner's representative who shall be given complete instructions, spare parts, manuals and maintenance information.

3.11 SYSTEM TESTING

- A. Prior to certification of the fire alarm system the contractor shall accomplish a complete test of the fire alarm system in accordance with NFPA 72, Chapter 7, Paragraph 7-2 Test Methods.
- B. Perform a complete, functional, component by component test of the entire fire alarm and detection system. Provide a detailed step by step testing procedure which is unique to this project, reflecting the type of system and the number and location of all components.
- C. Demonstrate the proper operation of each component as follows:
  - 1. Ionization, photoelectric, and duct smoke detectors: activate the detector with a "false smoke" product which has been specifically formulated for testing smoke detection systems.
  - 2. Heat detectors: activate the detector by utilizing the detector check button.
  - 3. Pull Stations: activate the station by operating the station in its normal mode.
  - 4. Audible and Visual Alarms: verify proper operation when the system is put into the alarm mode.
  - 5. Sprinkler Flow Switches: open the sprinkler system's inspection test valve. Verify that the flow switch sends an alarm signal within the allowed time corresponding to the switch's time delay setting.
  - 6. Fire Alarm Panels: functionally check-out and test the panel per the manufacturer's written instructions. Demonstrate the proper operation of each modular component. Demonstrate automatic power change to batteries and back to building power upon a drop in voltage below the voltage threshold as specified by the panel manufacturer.
- D. Demonstrate the supervisory function at each device loop circuit, and at all single component wiring runs such as for the sprinkler valve supervisory switches.

3.12 CERTIFICATION

- A. After completion of the installation of the system, the licensee shall complete a NFPA Inspection and Testing form. The Inspection and Testing form format shall be as indicated in NFPA 72, Chapter 7, Figure 7-5.2.2 Inspection and Testing Form. When an Inspection and Testing form has been completed, legible copies shall be distributed as directed by the Authority Having Jurisdiction.
- B. After an installation has been complete, affix a Fire Alarm Tag to the control panel. The Fire Alarm Tag is in addition to the Inspection and Testing form. Protect the Fire Alarm Tag from vandalism by applying pressure sensitive label; do not use a "tie-on" tag. It shall be as required in the Fire Safety Rules.

3.13 FINAL DRAWINGS

- A. As-built drawings shall be given to the Owner's representative, at time of instruction, in addition to those to be supplied as general requirements of the job.

3.14 AUTHORITY HAVING JURISDICTION

- A. The drawings and specifications herein comply to the best of the engineer's knowledge with all applicable codes at time of design. However, it is this Contractor's responsibility to coordinate/verify (prior to bid) the requirements of the authority having jurisdiction over this project and bring any discrepancies to the Engineer's attention at least seven days prior to bid.

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No changes in contract cost will be acceptable after the bid for work/equipment required to comply with the Authority Having Jurisdiction.

END OF SECTION