
IFB NO. Y15-732-MM

**INVITATION FOR BIDS
FOR
ORANGE COUNTY CONVENTION CENTER WEST CONCOURSE OPERABLE
SHADE REPLACEMENT**

**PART H
TECHNICAL SPECIFICATIONS**

VOLUME II

PROJECT MANUAL

Specifications

BID DOCUMENTS

Issued for Review
LHP-140819

**Orange County Convention Center
WEST CONCOURSE OPERABLE SHADES REPLACEMENT**

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SECTION 00842 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.

1.2 OSHA REGULATIONS:

It is the responsibility of the Contractor to insure that all OSHA regulations applying to this job are adhered to at all times.

1.3 FLORIDA RIGHT-TO-KNOW LAW:

- A. It is the responsibility of the Contractor to comply with the requirements of Chapter 442, Florida Statutes, as applicable to the work required to fulfill the Contractor's obligations under this contract. These requirements include, but are not necessarily limited to, the following:
 - 1. That if the work requires the direct purchase of any item designated as a toxic substance, the manufacturer, importer, or distributor of said toxic substance shall prepare and provide the purchaser (Contractor) with a Material Safety Data Sheet (MSDS) that is current, accurate, and complete.
 - 2. That every employer (Contractor) who manufactures, produces, uses, applies, or stores toxic substances in the workplace shall in a place where notices are normally posted post a notice informing employees of their rights under this statute.
 - 3. That every employer (Contractor) who manufactures, produces, uses, or applies toxic substances in the workplace shall maintain an MSDS for each product which is present in such workplace.
 - 4. That an independent contractor (Contractor) or subcontractor working in the workplace of another employer (Owner) may request in writing and shall have the right to examine the MSDS for the toxic substances to which he/she or his/her employees, are, have been, or may be exposed.
- B. A toxic substance is defined as any chemical substance or mixture in gaseous, liquid or solid state, if such substance appears on the "Florida Substance List" promulgated by the Department of Labor and Employment Security; is manufactured, produced, used, applied or stored in the workplace; and causes a significant risk to safety or health during, or as a proximate result of, any customary or reasonably foreseeable handling or use.
- C. Any questions regarding the above requirements should be directed to: Department of Labor and Employment Security, Bureau of Industrial Safety and Health, Toxic Waste Information Center, 2551 Executive Center Circle West, Tallahassee, FL 32301-5014, Telephone: 1-800-367-4378.

- D. The MSDS must be maintained by the user agency and must include the following information:
1. The Chemical name and the common name of the toxic substance.
 2. The hazards or other risks in the use of the toxic substance, including:
 - a. The potential for fire, explosion, corrosion, and reactivity.
 - b. The known acute and chronic health effects of risks from exposure, including the medical conditions which are generally recognized as being aggravated by exposure to the toxic substance;
 - c. The primary routes of entry and symptoms of overexposure.
 3. The proper precautions, handling practices, necessary personal protective equipment, and other safety precautions in the use of or exposure to the toxic substances, including appropriate emergency treatment in case of overexposure.
 4. The emergency procedure for spills, fire, disposal, and first aid.
 5. A description in lay terms of the known specific potential health risks posed by the toxic substance intended to alert any person reading this information.
 6. The year and month, if available, that the information was compiled and the name, address, and emergency telephone number of the manufacturer responsible for preparing the information.

END OF SECTION 00842

SECTION 01010 - SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 PROJECT DESCRIPTION

- A. Project Name: West Concourse Operable Shades Replacement

- 1. Project Location: Orange County Convention Center
9800 International Drive
Orlando, FL 32819

- B. Owner: Board of County Commissioners
Orange County Convention Center

- C. Architect: Le-Huu & Partners
4401 North Orange Blossom Trail
Orlando, Florida 32804
Telephone: 407-822-1111

- D. The Work is as follows:

- 1. Complete replacement of motorized window shade systems including associated power source and control devices. The work also includes new painting of architectural soffits as indicated in the drawings.

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

1.03 BUILDING/SITE SECURITY

- A. The construction site, to the limits indicated on the site plan drawings, shall be secured by means of a construction fence, located around the entire perimeter of the construction site. This construction fence shall be required to be secure from unwarranted entry at the end of each day.

1.04 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 by 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 use any portion of the site for storage or work areas or any legal purpose.
 - 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 Owners' 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.

1.05 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.

1.06 CONSTRUCTION BULLETIN BOARD

- A. The Contractor shall erect and maintain weather protected bulletin board of sufficient size to display all permits, notices and other documents required to be posted for the Project. Said bulletin board shall be in a location that provides unobstructed access for inspection by the Architect, the Project Manager, County Representatives, and authorities having jurisdiction over the project.

PART 2 PRODUCTS

2.01 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 Architect in Section 014000, QUALITY CONTROL. 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 01010

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01014 CONTRACTOR'S USE OF PREMISES

PART 1 – GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Contractor Agreement or Owner/Design-Contractor Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Refer to section 01016 for information regarding utility outages and dig permits.
- C. Refer to section 01310 for requirements regarding the coordination of work with the Orange County Convention Center (OCCC)'s Schedule.
- D. Refer to section 01500 for requirements related to Temporary Facilities & Controls.

1.2 DESCRIPTION OF WORK INCLUDED

This Section applies to situations in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, enter upon the OCCC's property.

1.3 QUALITY ASSURANCE

- A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.
- B. Require that all personnel who will enter upon the OCCC's property certify their awareness of and familiarity with the requirements of this Section.

1.4 TRANSPORTATION FACILITIES

- A. See section 01500 for information on the maintenance of safe and accessible paths of travel in and around the job site.
- B. Contractor's Vehicles:
 - 1. Require Contractor's vehicles, vehicles belonging to employees of the Contractor, and all other vehicles entering upon the OCCC's property in performance of the Work of the Contract, to use only agreed upon Access Route.
 - 2. Within the OCCC's approved fenced-in construction site area, the Contractor shall manage all site use, including approved parking by construction staff and employees. Do not permit vehicles to park on any street or other area of the OCCC's property except in areas designated by OCCC.

3. Outside the designated construction site area, all OCCC regulations regarding parking and accommodations for pedestrian use shall be strictly enforced.
4. Exceptions for temporary parking for construction delivery and construction access on curb side, walkways, vehicular parking, roadways and service drives that restricts or impedes normal traffic flow or use must be obtained from OCCC Project Manager. This exception is granted only for construction vehicles, not for private passenger vehicles. Any temporary use of pedestrian pathways that exceeds 24 hours duration will require provision for equal alternate pathways around the impediments and OCCC review. In addition, any temporary use of the site (exceeding 24 hours duration) that impedes building occupant egress must be reviewed by Orange County Fire Marshal.
5. Provide adequate protection for curbs and sidewalks over which trucks and equipment must pass to reach the job site.

1.5 INSPECTIONS and TESTS

- A. Architect / Engineer observations – To coincide with regularly scheduled Owner-Architect-Contractor meetings.
- B. Tests
 1. The Contractor shall notify OCCC of all scheduled tests at least 72 hours in advance.
 2. Properly completed test reports shall be provided at the conclusion of each test. It is the responsibility of the Contractor to maintain such reports through Final Completion, at which point they shall be submitted with other closeout materials, such as Operation & Maintenance manuals.

1.6 SECURITY

- A. Restrict the access of all persons entering upon the OCCC's property in connection with the Work to the access route and to the actual site of the Work.
- B. Restrict activities of employees to authorized areas. Employees shall not be allowed to mingle in public areas.
- C. The Contractor shall at all times guard against damage or loss to the property of the OCCC or other vendors or contractors and shall be held responsible for replacing or repairing any such loss or damage. The OCCC may withhold payment or make such deductions as deemed necessary to insure reimbursement or replacement for loss or damaged property through negligence of the successful bidder or his agents. Replace any trees, shrubs, lawns, or plantings damaged by Contractor or its subcontractors or vendors during work of this project within two (2) weeks of occurrence. Grassed areas generally have irrigation systems below grade; verify location of these systems and all underground utilities in

work or staging areas prior to start of construction. Repair utilities damaged by work of this project.

- D. For renovations or additions to existing buildings, the Contractor shall provide identification tags with photos for all personnel working on the site and shall require continuous use (wearing) of same at all times.

1.7 OCCC SECURITY REQUIREMENTS

The following requirements are to be met by Contractors and their subcontractors and vendors while engaged in construction projects at the OCCC. Any construction site located on the OCCC comes under the jurisdiction of the Orange County Sheriff Department. Any incident requiring police service should be reported to the Orange County Sheriff Department immediately.

- A. Construction firms and employees are to park their business and personal vehicles in authorized areas only.
- B. Parking permits are required for all personal and business vehicles.
- C. Employees are not permitted to enter OCCC buildings unless it is directly related to their job duties and must remain on job sites.
- D. Contractors and employees are to obey all laws as well as rules of the OCCC when they are on OCCC property.
- E. Contractors and employees are requested to secure all property as much as possible to reduce theft or damage to equipment or property. Contractors are expected to work with the OCCC Security personnel and participate in Crime Prevention efforts.

1.8 SECURITY AND IDENTIFICATION

1. Security and Identification

- A. 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), training records, payroll records, position for which hired including site location of any personnel 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.

- B. A Level 1 (5 years) Background Check 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 the Convention Center.

For security purposes and to maintain privacy when submitting FDLE Background Checks via e-mail the subject line of the email must contain the following ****EXEMPT****

The Convention Center will inform the contractor of their Background Check results.

Upon Background Check approval the contractor's staff shall arrange an appointment with the Convention Center 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.

- C. Contractor's employees will not be allowed in Orange County facilities without completed and approved background investigations.

1.9 PRE-CONSTRUCTION MEETING

- A. Prior to commencing Work at the site, the Contractor shall attend a pre-construction conference with the OCCC Project Manager, the Design Professional(s), other OCCC officials, and external agency representatives, if applicable.
- B. Contractor attendees shall include all field staff (project manager, superintendent(s), project engineer(s), and clerical assistants), plus major trade subcontractors as directed by the OCCC Project Manager.
- C. The parties will discuss the administrative, logistic, fiscal, and procedural requirements for the Work and for work in general at the job site.
- D. The template agenda for the meeting shall be provided by the OCCC Project Manager, who shall also arrange for attendance by other OCCC officials and outside agencies, if any. The Contractor shall record and distribute minutes.

END OF SECTION 01014

SECTION 01027 - APPLICATIONS FOR PAYMENT

PART I GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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 01340 – SUBMITTALS

1.03 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. Refer to Section 01200.
 - 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: Include the following project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the Architect
 - 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 breakdown 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:
 - a. A value will be given for at least every major specification section (subsections can logically be grouped together).
 - b. A single material subcontractor (i.e. sod, window blinds) 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. concrete, roofing, painting, 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. Concrete broken down at least into foundation slab on grade, columns, beams and suspended slabs.
 - g. Masonry divided into C.M.U. brick, stem walls, exterior walls, interior walls and elevator shaft.
 - h. Plumbing broken down at least into underslab rough-in, vents and stacks supply piping, equipment items (each listed separately), fixtures and trim.
 - i. HVAC: Typically shown per specification section, labor and material, per floor.
 - j. Electrical: same as HVAC.
 - k. Fire protection broken down at least into underground, rough-in and trim. All per building and labor and material.
 - l. Logical grouping of specification subsections is 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 Contractors' 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.

1.04 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as reviewed by the Owner 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. 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.
 - 1. Entries shall match data on the Schedule of Values and Contractors' 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.
- D. Transmittal: Submit five (5) 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.
- E. Payment will be processed once a month. Payment for item will be based on percentage completed as determined and approved by the County Project Manager or invoice for stored materials. Retainage (10%) will be held for all applications in accordance with Florida Statute 218.735 Local Government Prompt Payment Act.

- F. 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 occupancy of designated portions of the Work. Application shall also include all items listed in Part H. above in accordance with Florida Statute 218.735.

- G. 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 (Punch List)
 - 3. Notarized Contractor's Release of Lien (on Owner's form)
 - 4. Notarized Subcontractor and material supplier release of lien
 - 5. Notarized Consent of Surety
 - 6. Notarized Power of Attorney
 - 7. Notarized Asbestos-Free Letter (on Owner's form)

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01040 - PROJECT COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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 01200 Project Meetings.
- C. Requirements for the Contractor's Construction Schedule are included in Section 01300 Submittals.

1.03 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
 - 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.

1.04 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.
 - 4. Refer to Division-16 Section Basic Electrical Requirements for specific coordination drawing requirements for mechanical and electrical installations.
- 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 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 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 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 Architect/Project Manager for final decision.

3.02 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 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.03 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 Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 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
 - 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 Division 16 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 Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Refinish cutting and patching areas in a seamless and visually satisfactory 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. 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

PART 2 PRODUCTS

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

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 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 Carborundum saw or diamond core drill.
 - 5. By-pass utility services such as pipe or conduit, before cutting, where services are 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 by-passing 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 smooth painted surfaces, extend final coat over entire unbroken surfaces containing the patch, after the patched area has received primer and second coat.

3.04 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 01045

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SECTION 01153 - CHANGES IN THE WORK

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.
- B. Changes in the Work are described further in the General Conditions.

1.2 DESCRIPTION OF WORK INCLUDED:

Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Owner and issued after execution of the Contract, in accordance with the provisions of this Section.

1.3 QUALITY ASSURANCE:

Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.4 SUBMITTALS:

- A. Make submittals directly to the Architect/Engineer at the address shown on the Project Directory in the Project Manual.
- B. Submit the number of copies called for under the various items listed in this Section.

1.5 PRODUCT HANDLING:

- A. Maintain a combined "Register of Requests for Proposal and Construction Change Directives" and a separate "Register of Change Orders" at the job site, accurately reflecting current status of all pertinent data.
- B. Make the Registers available to the Architect/Engineer for review at his request.

1.6 PROCESSING CHANGES INITIATED BY THE CONTRACTOR:

- A. Should the Contractor discover a discrepancy among the Contract Documents, a concealed or unknown condition at variance with the conditions indicated by the Contract Documents, or other cause for suggesting a change in the Work, a change in the Contract Sum, or a change in the Contract Time of Completion, he shall notify the Architect/Engineer as required by pertinent provisions of the Contract

Documents.

- B. Upon agreement by the Architect/Engineer that there is reasonable cause to consider the Contractor's proposed change, the Architect/Engineer will issue either a Request for Proposal in accordance with Paragraph 1.7.A.1 below or a Construction Change Directive in accordance with the provisions described in Paragraph 1.7.B.1 below.

1.7 PROCESSING CHANGES INITIATED BY THE OWNER:

A. REQUESTS FOR PROPOSAL;

- 1. Issuance by Architect/Engineer - Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the Architect/Engineer will issue a "Request for Proposal" to the Contractor as directed by the Owner.
 - a. Requests for Proposal will be dated and will be numbered in sequence with Construction Change Directives.
 - b. The Request for Proposal will describe the contemplated change, and will instruct the Contractor to promptly advise the Architect/Engineer as to any credit or cost proposed for the described change. Any adjustment proposed to the Contract Sum shall be based on one of the methods described in the General Conditions.
 - c. The Request for Proposal is **not** an authorization to proceed with the change.
- 2. Response by Contractor - If the Contractor receives a Request for Proposal from the Architect/Engineer, the Contractor shall:
 - a. Analyze the described change and its impact on costs and time;
 - b. Consult with the Architect/Engineer and reach agreement on the most appropriate method described in the General Conditions for determining credit or cost for the change.
 - c. Secure the required information;
 - d. Submit a written reply as described below to the Architect/Engineer for review in response to each Request for Proposal received;
 - i. State proposed change in the Contract Sum, if any.
 - ii. State proposed change in the Contract Time of Completion, if any.
 - iii. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.
 - iv. Include full backup data such as subcontractor's or supplier's, et al, letters of proposal or similar information.

- v. Submit this response in single copy, signed, and on letterhead.
 - e. Meet with the Architect/Engineer as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective;
 - f. Alert pertinent personnel and subcontractors or suppliers, et al, as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect/Engineer in writing when such avoidance no longer is practicable.
 - 3. Agreement on Terms by All Parties - When the parties are in written agreement concerning the effect the change described in the Request for Proposal may, or may not, have on the Contract, and the Owner decides to proceed with the described change, one of the following shall apply;
 - a. Contract Adjustment Required - If the described change requires an adjustment to the Contract Sum, or the Contract Time of Completion, the Architect/Engineer initiates the Change Order Request Summary (a copy of which is included for reference only at the end of this Section) and provides it along with appropriate backup data to the OCCC Project Manager. The OCCC Project Manager then processes the Change Order as described in Paragraph 1.9.
 - b. Contract Adjustment Not Required - If the described change does not require an adjustment to either the Contract Sum or the Contract Time of Completion, a Change Order is deemed unnecessary.
 - 4. Disagreement on Terms - When there is disagreement concerning the effect the change described in the Request for Proposal may, or may not, have on the Contract, the Contractor shall continue to consult with the Architect/Engineer as necessary to reach agreement. Should the Owner decide to proceed with the Work prior to agreement being reached, the Architect/Engineer will issue a "Construction Change Directive" to the Contractor as described in Paragraph 1.7.B.1 below.
- B. CONSTRUCTION CHANGE DIRECTIVES;
- 1. Issuance by Architect/Engineer - Should the Owner wish to proceed with making a change in the Work or a change in the Contract Time of Completion, the Architect/Engineer will issue a "Construction Change Directive" to the Contractor in accordance to the General Conditions.

- a. Construction Change Directives will be dated and will be numbered in sequence with Requests for Proposal.
 - b. The Construction Change Directive will describe the desired change in the Work, and will carry one of the following instructions to the Contractor regarding adjusting the Contract:
 - i. "No Change in Contractual Costs or Time" Construction Change Directive - Make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion;
 - ii. "Contract Change Expected" Construction Change Directive - Make the described change in the Work, credit or cost for which will be determined in accordance to the General Conditions.
2. Response by Contractor to "No Change in Contractual Costs or Time" Construction Change Directive - If the Contractor has been directed by the Architect/Engineer to make the described change at no change in the Contract Sum and no change in the Contract Time of Completion, the Contractor shall:
- a. Proceed with the Work, incorporating the described change as appropriate.
 - b. Make a written reply as described below to the Architect/Engineer in response to each Construction Change Directive.
 - i. Indicate agreement or disagreement with the assertion that the described change can be made at no change in the Contract Sum and no change in the Contract Time of Completion.
 - ii. State proposed change in the Contract Sum, if any.
 - iii. State proposed change in the Contract Time of Completion, if any.
 - iv. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.
 - v. Include full backup data such as subcontractor's or materials supplier's letter of proposal or similar information.
 - vi. Submit this response in single copy, signed, and on letterhead.
3. Response by Contractor to "Contract Change Expected" Construction Change Directive - If the Contractor has been directed by the Architect/Engineer to make the described change subject to later determination of cost or credit, the Contractor shall:

- a. Proceed with the Work, incorporating the described change as appropriate.
 - b. Consult with the Architect/Engineer and reach agreement on the most appropriate method described in the General Conditions for determining credit or cost for the change.
 - c. Make written reply as described below to the Architect/Engineer in response to each Construction Change Directive.
 - i. State proposed change in the Contract Sum, if any.
 - ii. State proposed change in the Contract Time of Completion, if any.
 - iii. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.
 - iv. Include full backup data such as subcontractor's letter of proposal or similar information.
 - v. Submit this response in single copy, signed, and on letterhead.
4. Agreement on Terms by All Parties -
- a. Contract Adjustment Required - When a Construction Change Directive requires adjustment to either the Contract Time or the Contract Sum and has been agreed upon by all parties, the Architect/Engineer initiates the Change Order Request Summary (a copy of which is included at the end of this Section) and provides it along with appropriate backup data to the OCCC Project Manager. The OCCC Project Manager then processes the Change Order as described in Paragraph 1.9.
 - b. Contract Adjustment Not Required - When all parties are in written agreement that a Construction Change Directive does not require adjustment to the Contract Sum or the Contract Time of Completion, a Change Order is deemed unnecessary.
5. Disagreement on Terms;
- a. "No Change in Contractual Costs or Time" Construction Change Directive - If the Contractor has been directed by the Architect/Engineer to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Contractor wishes to make a claim for one or both of such changes, the Contractor shall proceed with the Work and notify the Architect/Engineer of the Contractor's disagreement by indicating any Contract adjustment requested in the written reply (signed and on letterhead) required by Paragraph 1.7.B above.

- b. "Contract Change Expected" Construction Change Directive
- When there is disagreement concerning the effect the change described in the Construction Change Directive may, or may not, have on the Contract, the Contractor shall continue to consult with the Architect/Engineer as necessary to reach agreement.

1.8 MAXIMUM PERCENTAGES AND OTHER CONSIDERATIONS OF A CONTRACT SUM CHANGE

Refer to the General Conditions for requirements.

1.9 PROCESSING CHANGE ORDERS:

Upon receipt of the Change Order Request Summary and appropriate backup data from the Architect/Engineer, the OCCC Project Manager will obtain the appropriate approvals and have the Change Order issued. This formal authorization is issued to the Contractor as a change to the contract amount or time. See Article 12 & 13 of the General Conditions.

Note: Change Orders are amendments to the contract either the contract amount or time.

END OF SECTION 01153

SECTION 01200 - PROJECT MEETINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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

1.03 PRE-CONSTRUCTION CONFERENCE

- A. Attends: The Owner representatives, 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.
- B. 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

- C. Contractor must submit at the time of the meeting at least the following items:
1. Schedule of Values
 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

1.04 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 Architect.

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.

1.05 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 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.

1.06 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 Architect, 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 01200

SECTION 01201 – PRE-CONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 RELATED SECTIONS:

Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 DESCRIPTION OF WORK INCLUDED:

To help clarify construction contract administration procedures, the Architect/Engineer will conduct a Pre-Construction Conference prior to start of Work. Provide attendance by the designated personnel.

1.3 QUALITY ASSURANCE:

Representatives attending the Pre-Construction Conference should have the authority to speak for their organization.

1.4 SUBMITTALS:

- A. To the maximum extent practicable, the Contractor shall advise the Architect/ Engineer at least 24 hours in advance of the Conference as to items to be added to the agenda.
- B. The Architect/Engineer will compile minutes of the Conference, and will furnish three copies of the minutes to the Contractor and required copies to the Owner. The Contractor may make and distribute such other copies as he wishes.

1.5 PRE-CONSTRUCTION CONFERENCE:

- A. The Conference will be scheduled commensurate with the Notice to Proceed, but prior to actual start of the Work.
- B. ATTENDANCE:
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Architect/Engineer will advise other interested parties, including the Owner, and request their attendance.

C. MINIMUM AGENDA:

Data will be distributed and discussed on:

1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and the Architect/Engineer;
2. Channels and procedures for communication;
3. Construction schedules, sequence of critical work, schedule of values, details, work by subcontractors, offsite fabrication, revisions, updating, maintenance, reissue;
4. Contract Documents, including distribution of required copies of Drawings and revisions;
5. Processing of Shop Drawings and other data submitted to the Architect/ Engineer for review;
6. Processing of field decisions and Change Orders;
7. Rules and regulations governing performance of the Work;
8. Hot Work Policy; comply with Appendix "C" of Construction Standards.
9. Procedures for safety and first aid, security, and quality control, housekeeping, barricades, control of work involving generation of noxious fumes/odors, noise, et al, potential disruption to building occupants, special precautions, and related matters;
10. Project Signs; Felony Trespassing, and Anti-Harassment. (No other signs are allowed.)
11. Assignment of Vehicular Parking and Staging Area;
12. Toilet Facilities;
13. Completion - time extensions - liquidated damages;
14. Lock Cylinders for Work and access to Work;
15. Storage Facilities;
16. Working Hours;
17. Completion Inspections - Substantial and Final;
18. Payment Procedures and Forms;
19. "As-Built" Drawings and Manuals;
20. Fire Suppression Equipment ;
21. Workmanship and Quality;
22. Site supervision including work by subcontractors and sub-subcontractors;
23. Waivers of lien and Performance Bond,
24. The Contractor's provision of Proof of Insurance;
25. Quality Conformance Inspection Request and Report;

END OF SECTION 01201

SECTION 01310 - CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.

1.2 DESCRIPTION:

A. WORK INCLUDED:

To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Architect/Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.

B. RELATED WORK:

- 1. Requirements for Progress Schedule: General Conditions
- 2. Construction Period: As per Contract.

C. DEFINITIONS:

"Day", as used throughout the Contract unless otherwise stated, means "calendar day" (Section 01091, Definitions and Standards).

1.3 QUALITY ASSURANCE:

- A. Employ, if necessary, a scheduler who is thoroughly trained and experienced in compiling construction schedule date, and in preparing and issuing periodic reports as required below.
- B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Architect/Engineer.
- C. Reliance upon the approved schedule:
 - 1. The construction schedule as approved by the Architect/Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
 - 2. Should any activity not be completed within 15 days after the stated schedule date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.

3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
4. Costs incurred by the Owner and by the Architect/Engineer in connection with expediting construction activity under this Article shall be reimbursed by the Contractor.
5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.4 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340, Submittals.

B. CONSTRUCTION SCHEDULE:

Within ten (10) calendar days after the Contractor has received the Owners' Notice to Proceed, submit one (1) reproducible copy and four (4) prints of a construction schedule prepared in accordance with Part 3 of this Section.

C. PERIODIC REPORTS:

After the above-mentioned construction schedule is approved, if the OCCC Project Manager deems it to be necessary, the Contractor will be required to submit periodic updates of the construction schedule consisting of four (4) prints of the construction schedule updated as described in Part 3 of this Section.

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS:

- A. Graphically show by bar chart the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
- B. Include, but do not necessarily limit indicated activities to:
1. Project mobilization;
 2. Submittal and approval of Shop Drawings and Samples;
 3. Procurement of equipment and critical materials;
 4. Fabrication of special material and equipment, and its installation and testing;
 5. Final cleanup;
 6. Final inspecting and testing;

7. All activities by the Architect/Engineer that affect progress, required dates for completion, or both, for all and each part of the Work.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE:

- A. As soon as practical after receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Architect/Engineer, review contents of the proposed construction schedule, and make all revisions agreed upon. Contractor will coordinate his work with the OCCC Schedule. Construction work will be so scheduled and carried out that the normal operations of the OCCC must be given first priority. This applies particularly to outages of Utilities and restriction of access. Such construction operations must be carried out outside of normal working hours and by overtime, weekend, and holiday working. *It shall be the contractor's responsibility to provide for this in the Bid.*
- B. Submit in accordance with Paragraph 1.4 above.

3.2 PERIODIC REPORTS:

As required under Paragraph 1.4 above, update the approved construction schedule.

- A. Indicate "actual" progress in percent completion for each activity;
- B. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.3 REVISIONS:

Make only those revisions to approved construction schedule as are approved in advance by the Architect/Engineer.

END OF SECTION 01310

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SECTION 01323 - PHOTOGRAPHIC DOCUMENTATION

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 administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Closeout" for procedures for closeout requirements.

1.3 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each [photograph]. Indicate elevation or story of construction. Include same label information as corresponding [set of photographs].
- B. Construction Photographs: Submit [three] prints of each photographic view within [seven] days of taking photographs.
 - 1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte prints on single-weight commercial-grade photographic paper, [mounted on linen or card stock to allow a 1-inch- (25-mm-) wide margin and] [enclosed back to back in clear plastic sleeves that are] punched for standard 3-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Contractor.
 - d. Date photograph was taken if not date stamped by camera.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

- f. Unique sequential identifier.
3. Digital Images: Submit a complete set of digital image electronic files [with each submittal of prints] [as a Project Record Document] on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than [1024 by 768] pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in filename for each image.
 - 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect [.
- C. Preconstruction Photographs: Before [commencement of demolition] , take [color] [, digital] photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by [Architect] .
 - 1. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take [12] [color] [, digital] photographs [weekly, with timing each month adjusted to coincide] with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

1. Frequency: Take photographs [weekly, with timing each month adjusted to coincide] < with the cutoff date associated with each Application for Payment.
- E. Final Completion Construction Photographs: Take [eight] color photographs after date of Substantial Completion for submission as Project Record Documents. [Architect] will direct for desired vantage points.
1. Do not include date stamp.

END OF SECTION 01323

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SECTION 01340 - SUBMITTAL PROCEDURES

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 administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Applications for Payment."
 - 2. Division 01 Section "Schedule of Values."
 - 3. Division 01 Section "Project Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 4. Division 01 Section "Construction Schedules" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 5. Division 01 Section "Photographic Documentation" for submitting construction photographs.
 - 6. Division 01 Section "Quality Control Service" for submitting test and inspection reports and for mockup requirements.
 - 7. Division 01 Section "Project Closeout" for submitting warranties.
 - 8. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 9. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's and Construction Manager's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Substitutions: Refer to section 016031 SUBSTITUTIONS
- C. Or Equal: Where the phrase "or equal", or "or equal as approved by the Architect/ Engineer", occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this Work by the Architect/ Engineer.
 - 1. The decision of the Architect/Engineer shall be final.
- D. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Schedules" for list of submittals and time requirements for scheduled performance of related construction activities.
- E. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- F. Identification: Place a permanent stamp 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 Architect and Construction Manager.
 - 3. Include the following information on label for processing and recording action taken:

- a. Project name.
 - b. Date.
 - c. Name and address of Architect and Construction Manager.
 - 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., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
 - 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.
- G. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- H. Additional Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- 1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
- 1. Transmittal Form: Use CSI Form 12.1A
 - 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number numbered consecutively.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.
 - m. Signature of transmitter.

3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked "Approved" or "Approved as Noted."
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals with mark indicating "'Approved" or "Approved as Noted" taken by Architect.
- 1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES
- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
1. The electronic drawing is provided "as-is" without guarantee or warranty of any kind.
 2. The signed and sealed drawing, in its printed form, is the official depiction of the project and in no way will be supplanted in authority by the electronic form of the drawing.
 3. The Architect/Engineer accepts no liability for any information extracted from the electronic form of the drawing, and does not guarantee the electronic drawing is totally complete or correct when used outside our control.
 4. Copies of the electronic drawing are exclusively for your Company's use for the referenced project only. Copies of the electronic drawing will not be supplied to others or utilized in any fashion without the express written consent of the Architect/Engineer.
 5. The Architect/Engineer will not be responsible for any changes to the electronic drawing.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Number of Copies: Submit four copies of Product Data, unless otherwise indicated. Architect will return **three** copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.

- f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.
 4. Number of Copies: Submit four opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain one copy; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - 1) Submit a single full-size mock-up where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation" for Construction Manager's action.
- F. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Application for Payment."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Control Service."
- B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Control Service."
- N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.

4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- V. Construction Photographs: Comply with requirements specified in Division 01 Section " Photographic Documentation."
- W. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Shop Drawings submitted to the Architect/Engineer for approval shall first be checked and approved by the Contractor, the evidence of which shall be a "checked" stamp marked "Approved", or "Approved as Noted", on each copy of each Shop Drawing, placed thereon by the Contractor.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement

certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's "checked" stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Each drawing correctly submitted will be checked by the Architect/Engineer and marked "Approved", "Approved as Noted", "Revise and Resubmit", or "Rejected".
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01340

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SECTION 01370 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 DESCRIPTION OF WORK INCLUDED:

- A. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. The breakdown of the Work shall be made according to the format of the Construction Specifications Institute's "Master List of Titles and Numbers for the Construction Industry" (1988 Edition).

1.3 QUALITY ASSURANCE:

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Architect/Engineer, provide copies of the subcontracts or other data acceptable to the Architect/Engineer, substantiating the sums described.

1.4 SUBMITTALS:

Within twenty (20) days after receipt of Notice to Proceed, the Contractor shall submit a proposed Schedule of Values to the Architect/Engineer.

- A. Meet with the Architect/Engineer and determine additional data, if any, required to be submitted.
- B. Secure the Architect/Engineer's approval of the Schedule of Values prior to submitting first application for payment.
- C. Submit Schedule of Values during the pre-construction meeting in accordance with Orange County procedures.

END OF SECTION 01370

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SECTION 01400 - QUALITY REQUIREMENTS

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 administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Schedules" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 09 through 16 Sections for specific test and inspection requirements.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.

- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect [, through], with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect [.
 2. Notify Architect [seven] days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's [approval of mockups before starting work, fabrication, or construction.
 - a. Allow [seven] days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 09 through 16.

1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor[, and the Contract Sum will be adjusted by Change Order].

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least [48] hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within [30] days of date established for commencement of the Work.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

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SECTION 01505 CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.

1.2 HAZARDOUS SUBSTANCES

- A. The builder is responsible for proper management of hazardous substances used, stored, handled, generated, or disposed of by his own construction activities (e.g., excess or unwanted hazardous construction-related materials, including, but not limited to: equipment lubricants, used oil filters, aerosols, paints, activators, adhesives, caulks, and other hazardous wastes). In no case shall such construction hazardous waste be commingled with demolition hazardous waste. In no case shall such construction hazardous waste be commingled with non-hazardous construction or demolition waste.
- B. Evaluation, on-site storage, transportation, disposal and other aspects of Hazardous Waste Management shall comply with applicable Federal, State, and local laws.

1.3 SOLID WASTE MANAGEMENT PLAN, REPORTS, and LOGS

- A. Provide for the management of construction and demolition waste through reuse, recycling and reduction methods. Typical designated waste streams include land clearing debris, concrete and masonry, metals and appliances, dimensional wood & lumber, wooden pallets.
- B. Contractor shall designate an on-site party responsible for implementing the plan and instructing workers, distributing plan to site foremen and each subcontractor, including the plan in worker orientation and safety meetings, and providing site instruction and supervision on separation, handling, and recovery methods.
- C. Contractor shall submit a Construction Solid Waste Management Plan to the OCCC Project Manager prior to mobilization.
- D. Maintenance of a Construction Waste Log (dates, facility, transporter, weights) and a file of waste receipts for all wastes shipped off-site.
- E. Maintain onsite logs, including manifests, weight tickets, and receipts. Manifests shall be from recycling and disposal site operators who can legally accept the materials for the purpose of reuse, recycling, or disposal.

END OF SECTION 01505

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SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 1. Division 1 Section "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 2. Section 01300 "Submittals" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.
 3. Division 1 Section "Substitutions" specifies administrative procedures for handling requests for substitutions made after award of the Contract.

1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well- recognized meanings in the construction industry.
 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.04 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.
- B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:
1. No available domestic product complies with the Contract Documents.
 2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.
- D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
 1. Specification Requirements: Where Specifications name only one or two products or manufacturers, others may be submitted for review by the Architect as being "acceptable equals" to though specified.
 2. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or
- C. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
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5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
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PART 2 - PRODUCTS

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 1. Specification Requirements: Where Specifications name only one or two products or manufacturers, others may be submitted for review by the Architect as being "acceptable equals" to though specified.
 2. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 3. Performance Specifications Requirements: Where Specifications require compliance with performance
 4. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.

5. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

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SECTION 016031 – SUBSTITUTIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 01 09 50 "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 - 2. Section 01 30 00 "Submittals" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.
 - 3. Section 01 60 00 "Materials and Equipment" specifies requirements governing the Contractor's selection of products and product options.
- C. Substitutions:
 - 1. Prior to Bid Date:
 - a. A written request for the substitution of a Product must be received by the Procurement Division a minimum of 14 days prior to the receipt of Bids, for Architect's and Owner's Project Manager review. If accepted, an Addendum may be issued.
 - 2. After the Award of Contract:
 - a. OCCC Capital Planning Division and the Design Team Lead will consider a request by the contractor for substitution where the specified product cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - b. OCCC Capital Planning Division and the Design Team Lead will consider a request by the Contractor for a substitution after the award of the Contract where substantial advantage is offered to the Owner in terms of:
 - 1) A credit is offered for substitution of a Product accepted as an approved equal to a specified item by the Architect.
 - 2) A Product has been accepted by the Architect as being of greater quality at no additional cost to the Owner.
 - 3) The Products specified, for no fault of the Contractor, cannot be obtained.
 - 4) The Architect will consider a request for substitution when the specified Product cannot be provided in a manner which is compatible with other materials of the work.

- 5) The Architect will consider a request for substitution when the specified Product cannot be properly coordinated with other materials in the work
 - 6) The Architect will consider a request for substitution when the specified Product cannot receive a warranty as required by the Contract Documents.
3. The Contractor, Subcontractor or Supplier who is recommending the Substitution shall compensate the Architect/Engineer for expenditures necessary in reviewing the proposed substitution. Prevailing hourly billing rates shall be used plus 20%.

1.3 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
1. Products, are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term Product as used herein includes the terms "material," "equipment," "system" and other terms of similar intent.
 2. Named Products, are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the contract documents.
 3. Materials, are products that must be substantially cut, shaped, worked, mixed, motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
 4. Equipment, is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents. The following are not considered to be requests for substitutions:
1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 2. Revisions to the Contract Documents requested by the Owner, Architect or Engineers are considered as changes and not substitutions.
 3. Specified options of products and construction methods included in the Contract Documents.
 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

A. Substitution Request Submittal:

1. Submit 6 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and or to construction necessary to accommodate the proposed substitution. The Contractor shall certify that the Substitution, if accepted, would be complete and no additional cost to the Owner would be required.
 - b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - 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 to the Contract Sum.
 - g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
 - h. 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.
4. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation. Acceptance will be in the form of a change order.
 - a. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.
1. Extensive revisions to the Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of the Contract Documents.
 3. The request is timely, fully documented, and properly submitted.
 4. The Architect will not consider the request if the specified product or method cannot be provided as a result of the Contractor failure to pursue the Work promptly or coordinate activities properly
 5. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations.
 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 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 provides the required warranty.
- B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION 016031

SECTION 01700 - PROJECT CLOSEOUT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Close-out requirements for specific construction activities are included in the appropriate Sections in Divisions 9, 12, and 16.
- C. Final Payment to be made when the County has received all required close-out documents.

1.03 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.
 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 Architect/Consultants and the Owner. Cost will be deducted from the Contractor's retainage.

1.04 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 Architect 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 Architect 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 Architect.

1. Upon completion of reinspection, the Architect 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.

1.05 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect'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 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.
 4. Organize record drawing sheets, and print suitable titles, dates and other identification on the cover of each set.
 5. Provide three (3) additional sets of black line drawing sets of As-Built Drawings.
- 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 Architect 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 Architect 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 Architect 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 five (5) suitable sets of manageable size. 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
 8. Fixture lamping schedule

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 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. Identification systems
7. Control sequences
8. Hazards
9. Cleaning
10. Warranties and bonds
11. Maintenance agreements and similar continuing commitments
12. 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

3.02 PROJECT CLOSE-OUT MANUALS AT SUBSTANTIAL COMPLETION

- A. Submit Project Close-out Manuals prior to issuance of final application for payment. Provide three (3) copies.
- B. Bind in commercial quality 8 ½" 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.

- 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.

3.03 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in Section - Temporary Facilities.
- 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.
 - 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 01700

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SECTION 01710 - CLEANING

PART 1 - GENERAL

1.1 RELATED SECTIONS:

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

1.2 DESCRIPTION OF WORK INCLUDED:

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

1.3 QUALITY ASSURANCE:

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT:

Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY:

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

PART 3 - EXECUTION

3.1 PROGRESS CLEANING:

- A. GENERAL:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required

protection of materials.

2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of the Work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment.

B. SITE:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.1-A-1.
3. Maintain the site in a neat and orderly condition at all times.

C. STRUCTURES:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean. ("Clean", for the purpose of this subparagraph shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.)
3. As required preparatory to installation of succeeding materials, clean the structures of pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which materials are installed.

("Clean", for the purpose of this paragraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect/Engineer, may be injurious to the finish floor material.)

3.2 FINAL CLEANING:

- A. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

- B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.
- C. SITE:
 - 1. Unless otherwise specifically directed by the Architect/Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
 - 2. Completely remove resultant debris.
- D. STRUCTURES:
 - 1. Exterior:
 - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
 - d. In the event of stubborn stains not removable with water, the Architect/Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.
 - 2. Interior:
 - a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
 - b. Remove all traces of splashed material from adjacent surfaces.
 - c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
 - 3. Glass: Clean inside and outside.
 - 4. Polished surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.
- E. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY:

Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect/Engineer in accordance with the General Conditions of the Contract.

END OF SECTION 01710

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.
- B. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.2 DESCRIPTION OF WORK INCLUDED:

- A. Throughout progress of the work, maintain an accurate record of changes in the Contract Documents, as described in Paragraph 3.1 below.
- B. Upon completion of the Work, submit the recorded changes to the Architect/Engineer as described in Paragraphs 2.1.B and 3.2.B below.

1.3 QUALITY ASSURANCE:

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect/Engineer.
- B. ACCURACY OF RECORDS:
 - 1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
 - 2. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.
- C. Make entries within 24 hours after receipt of information that the change has occurred.

1.4 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.
- B. Prior to submitting each request for progress payment, secure the Architect/ Engineer's approval of the current status of the Project Record Documents as that approval may be a prerequisite for the Architect/Engineer to approve requests for progress payments and the request for Final Payment under the Contract.

- C. Prior to submitting request for final payment, submit the job set of the Project Record Documents to the Architect/Engineer and secure his approval.

1.5 PRODUCT HANDLING:

- A. Maintain the job set of the Record Documents completely protected from deterioration and from loss and damage until completion of the Work and submittal of the job set to the Architect/Engineer for his transfer of all recorded data to the final Project Record Documents.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect/Engineer's approval.
 - 1. Such means shall include, if necessary in the opinion of the Architect/Engineer, removal and replacement of concealing materials.
 - 2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.1 RECORD DOCUMENTS:

- A. JOB SET:

Promptly following receipt of the Owner's Notice to Proceed, secure from OC Purchasing Department at no charge to the Contractor one complete set of all Documents comprising the Contract. (If necessary, replacement sets are available from the Architect/Engineer at the Architect/Engineer's usual charge for reproduction and handling.)

- B. FINAL RECORD DOCUMENTS:

At the completion of the Work, the Contractor shall submit the job set of the Record Documents to the Architect/Engineer for review and approval. The Architect/Engineer is responsible to transfer all recorded data from the job set to the final Project Record Documents and to submit these documents to the Project Manager. Record documents shall indicate the "as-built" condition. Intermediate design representations not indicating the "as-built" condition shall be deleted from the Contract drawings by the Architect/Engineer. (The items comprising the final Project Record Documents are determined by the OCCC's Request For Proposal to the Architect/ Engineer, but generally include "as-built" mylars of the Contract drawings, "as-built" AutoCAD-format computer files of the Contract drawings, Word or WordPerfect-format computer files of the "as-built" Contract specifications, and "before" and "after" 8"x10" jobsite photographs. Refer to Section 01700, Paragraph 1.4.C.1) Other Contractor-provided closeout submittals are described in Section 01700,

Paragraph 1.4.C.2.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET::

- A. Immediately upon receipt of the job set described in Paragraph 2.1.A above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET".
- B. PRESERVATION:
 - 1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect/Engineer.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Architect/Engineer.
 - 3. Maintain the job set at the site of work as that site is designated by the Architect/Engineer.
- C. MAKING ENTRIES ON DRAWINGS:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required. Clearly indicate at each affected detail and other Drawing a full description of changes made during construction, and the actual location of items described in Paragraph 3.1.E.1 below.
 - 2. Date all entries.
 - 3. Call attention to the entry by a "cloud" drawn around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.
- D. MAKING ENTRIES ON THE OTHER PERTINENT DOCUMENTS:

Make entries in the pertinent other Documents as approved by the Architect/Engineer.
- E. CONVERSION OF SCHEMATIC LAYOUTS:
 - 1. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items, are shown schematically and are not intended to portray precise physical layout.
 - a. Final physical arrangement is determined by the Contractor, subject to the Architect/Engineer's approval.

- b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the drawings.
2. Show on the job set of Record Drawings, by dimensions accurate to within one inch, the centerline of each run of items such as are described in Paragraph 3.1.E.1.
 - a. Clearly identify the item by accurate notes such as "cast iron drain", "galv. water", and the like.
 - b. Show, by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed", and the like).
 - c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.

3.2 FINAL PROJECT RECORD DOCUMENTS:

- A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of the work to proceed without lengthy and expensive site measurement, investigation, and examination.
- B. APPROVAL OF RECORDED DATA:
 1. At the completion of the Work, submit the completed job set of the Project Record Documents to the Architect/Engineer for review.
 2. Participate in review meetings and promptly provide any additional information requested and/or make revisions to the job set as required to obtain the Architect/Engineer's approval of the job set as accurate and complete.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE:

The Contractor has no responsibility for recording changes in the work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

END OF SECTION 01720

SECTION 01730 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED SECTIONS:

- A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.
- B. Required contents of submittals also may be amplified in pertinent other Sections of these Specifications.
- C. Refer to Section 01340 – Submittal Procedures for additional requirements regarding submittals.

1.2 DESCRIPTION OF WORK INCLUDED:

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

1.3 QUALITY ASSURANCE:

In preparing data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section, and skilled in technical writing to the extent needed for communicating the essential data.

1.4 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340 - Submittals and Substitutions.
- B. In sufficient time that they may be reviewed and commented on by the Architect/Engineer and then returned to the Contractor for his/her completion and return to the Architect/Engineer for issue to OCCC operating personnel, submit two copies of a preliminary draft of the proposed Manuals to the Architect/Engineer.
- C. Unless otherwise directed in other Sections, or in writing by the Architect/Engineer, submit three copies of the final Manual to the Architect/Engineer at least one week prior to Substantial Completion.

PART 2 - PRODUCTS

2.1 INSTRUCTION MANUALS:

- A. Where Instruction Manuals are required to be submitted under other Sections of these Specifications, prepare in accordance with the provisions of this Section.
- B. **FORMAT:**
 - 1. Size: 8-1/2" x 11".
 - 2. Paper: White Bond, at least 20 lb. weight.
 - 3. Text: Neatly written or printed.
 - 4. Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable but fold to fit within the Manual and provide a drawing pocket inside rear cover or bind in with text.
 - 5. Flysheets: Separate each portion of the Manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in color.
 - 6. Binding: Use heavy-duty plastic or fiberboard covers with binding mechanism concealed inside the Manual; 3-ring binders will be acceptable; all binding is subject to the Architect/ Engineer's approval.
 - 7. Measurements: Provide all measurements in U.S. standard units such as feet-and-inches, lbs., and cfm.
- C. Provide front and back covers for each manual, using durable material approved by the Architect/Engineer, and clearly identified on or through the cover with at least the following information:

OPERATING AND MAINTENANCE INSTRUCTIONS

name and address of work
name of contractor
general subject of this Manual
space for approval signature of
the Architect/Engineer and approval date

- D. **CONTENTS:**

Include at least the following:

 - 1. Neatly typewritten index near front of the Manual, giving information as to location within the Manual of all emergency information regarding the installation.
 - 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly and reassembly.
 - 3. Complete nomenclature of all parts of all equipment.

4. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other data pertinent to procurement procedures.
5. Copy all guarantees and warranties issued.
6. Manufacturer's bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation, and deleting or otherwise clearly indicating, all manufacturer's data with which this installation is not concerned.
7. Such other data as required in pertinent Sections of these Specifications.

PART 3 - EXECUTION

3.1 INSTRUCTION MANUALS:

A. PRELIMINARY:

1. Prepare a preliminary draft of each proposed Manual.
2. Show general arrangement, nature of contents in each portion, probable number of drawings and their size, and proposed method of binding and covering.
3. Secure the Architect/Engineer's approval prior to proceeding.

B. FINAL:

Complete the Manuals in strict accordance with the approved preliminary drafts and the Architect/Engineer's review comments.

C. REVISIONS:

Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of the Manual with Architect/Engineer.

3.2 MAINTENANCE INSTRUCTION:

- A. It is required that Physical Plant representatives be instructed in operating and maintenance procedures for installed equipment.
- B. In particular, this applies to the Physical Plant Electrical and Air Conditioning tradesman.
- C. In addition, special tools for use on light switches, A/C controls, etc., should be minimized if at all possible. Special tools desired are specified.

END OF SECTION 01730

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SECTION 01740 - WARRANTIES AND BONDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contractor Documents, including manufacturer's 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 the individual Sections of Division 9, 12, and 16.
 - 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.

1.03 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.

1.04 WARRANTY PERIOD

- A. The Contractor shall participate with the County and the Architect'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 Architect/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.

1.05 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. If the Architect'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 Architect for approval prior to final execution.
 - 1. Refer to individual Sections of Division 9, 12, and 16 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 ½" 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.
 - 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 01740

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Gypsum board.
 - 2. Plaster.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional [5] <FIVE > percent, but not less than [1 gal. (3.8 L)] <Insert number> of each material and color applied.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers:

- A. Benjamin Moore Paints

- B. Pittsburg Paints
- C. Sherwin Williams Paints

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: **Match existing surfaces and as approved by Owner.**

PART 3 - BASIS OF DESIGN

- A. DRYWALL (Walls, Ceilings, Soffits, Gypsum Board) (Repaint)

1. **Epoxy Systems (Water Base)**

- a. Gloss Finish

1st Coat: S-W ProMar 200 Zero VOC Latex Primer, B28W2600

(4 mils wet, 1.5 mils dry)

300 2nd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy Gloss, B73-Series

300 3rd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy Gloss, B73-Series

(2.0- 4 mils dry per coat)

END OF SECTION 099123

SECTION 12494 ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Room darkening roller shades.

1.2 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- C. Shop Drawings, Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Prepare shop drawings on AutoCAD format using base sheets provided electronically by the Architect.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be acceptable in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- F. Mock-Up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

- A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.
- B. Standard Shadecloth: Manufacturer's standard twenty-five (25) year warranty.
- C. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five year warranty.
- D. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: MechoShade Systems

MechoShade Systems, Inc.,

42-03 35th Street, Long Island City, NY 11101

Tel: 1 407 335 9569; Email: jonathan.gossell@mechosystems.com Web: www.mechoshade.com

B. Or approved equal.

2.2 ROLLER SHADE TYPES

A. Motorized Shades:

1. Mounting: Recess mounted with existing ceiling pocket or fascia.
2. Configuration: Single blackout shadecloth.
3. Blackout Shadecloths:
 - a. Fabric: ThermoVeil 0700, laminated and embossed vinyl coated fabric blackout material.
 - b. Color: Black
4. Controls: Electrically operated, IQ/MLC low voltage control system.

2.3 SHADE CLOTH

- A. Room Darkening Shadecloth: MechoShade Systems, Inc., ThermoVeil 0700 series, blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick (0.30 mm) blackout material and weighing 0.81 lbs. per square yard, with a minimum of 62 threads per square inch.

2.4 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 2. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.

- c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
- d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
- e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Standard concealed hem bar.
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F. Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in an integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.
 - 1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

2. Batten pockets shall be self-colored fabric front and back RF welded into the shade cloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.
- G. Blackout shadebands, when not used in side channels, shall have rigid / cable edge support to prevent movement when shadebands are in the down position.

2.6 COMPONENTS

- A. Access and Material Requirements:
1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- B. Motorized Shade Hardware and Shade Brackets:
1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
 2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).

2.7 SHADE MOTOR DRIVE SYSTEM

- A. Shade Motors:
1. Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor operating at 110v AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
 2. Conceal motors inside shade roller tube.
 3. Maximum current draw for each shade motor of 2.3 amps.
 4. Use motors rated at the same nominal speed for all shades in the same room.
- B. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.

2.8 MOTOR CONTROL SYSTEMS

- A. IQ/MLC: Specifications and design of shade motors and motor control system are based on the IQ/MLC motor logic control system manufactured by MechoShade Systems, Inc. Other systems may be acceptable provide that all of the following performance capabilities are provided. Motor logic control systems not in complete compliance with these performance criteria shall not be accepted as equal systems.
1. Motor Control System:
 - a. Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based motor logic controllers (IQ/MLC).
 - b. Control system components shall provide appropriate (spike and brown out) over-current protection (+/- 10 percent of line voltage) for each of the four individual motor circuits and shall be rated by UL or ETL as a recognized component of this system and tested as an integrated system.
 - c. Motor control system shall allow each group of four shade motors in any combination to be controlled by each of four local switch ports, with up to fourteen possible "sub-group" combinations via local 3 button wall switches and all at once via a master 3 button switch. System shall allow for overlapping switch combinations from two or more local switches.
 - d. Multiple "sub-groups" from different IQ/MLC control components shall be capable of being combined to form "groups" operated by a single 3 button wall switch, from either the master port or in series from a local switch port.
 - e. Each shade motor shall be accessible (for control purposes) from up to four local switches and one master switch.
 - f. Control system shall allow for automatic alignment of shade hem bars in stopped position at 25 percent, 50 percent, and 75 percent of opening heights, and up to three user-defined intermediate stopping positions in addition to all up / all down, regardless of shade height, for a total of five positions. Control system shall allow shades to be stopped at any point in the opening height noting that shades may not be in alignment at these non-defined positions).
 - g. Control system shall have two standard operating modes: Normal mode allowing the shades to be stopped anywhere in the window's opening height and uniform mode, allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up / all down positioning.
 - h. Control system components shall allow for interface with both audiovisual system components and building fire and life safety system via a dry contact terminal block.
 - i. Control system components shall allow for interface with external analog input control devices such as solar activated controllers, 24 hour timers, and similar items; via a dry contact terminal block.
 - j. Reconfiguration of switch groups shall not require rewiring of the hardwired line voltage motor power supply wiring, or the low voltage control wiring. Reconfiguration of switch groups shall be accomplished within the motor control device (IQ/MLC).

2. Wall Switches:
 - a. Three-button architectural flush mounted switches with metal cover plate and no exposed fasteners.
 - b. Connect local wall switches to control system components via low voltage (12V DC) 4-conductor modular cable equipped with RJ-11 type connectors supplied, installed and certified under Division 16 - Electrical.
 - c. Connect master wall switches to control system components via low voltage (12V DC) 6-conductor modular cable equipped with RJ-12 type connectors supplied, installed and certified under Division 16 - Electrical.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared, inspected and approved by OCCC Project Manager.
- B. If substrate preparation is the responsibility of another installer, notify OCCC Project Manager and Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Turn-Key Single-Source Responsibility for Motorized Interior Roller Shades: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the roller shade installer/dealer, in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:
 1. Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer's requirements, as indicated on the mechanical and electrical drawings.
 2. Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
 3. Contractor shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.

4. Contractor shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/ control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.
 5. Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location or schedule.
- C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
 - D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
 - E. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
- 3.4 PROTECTION
- A. Protect installed products until completion of project.
 - B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12494

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes Basic Electrical Requirements specifically applicable to Division 16 Sections, in addition to Division 1 - 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, 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 16 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 16 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.
- G. The Contractor shall provide and install panic hardware on all electrical room doors where the electrical room houses equipment rated 1200 amps or more per NEC 110.26. All electrical room doors shall open in the direction of egress.

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 16014 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.

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 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] [non-school] operating hours unless otherwise accepted by Owner. Protect existing buildings and equipment during construction.
- K. See Section Minor 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 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.
- 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 16 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.
- 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 a currently licensed Florida Registered Electrical Contractor (ER).

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. Mechanical operating shades.
- 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 16 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.
- G. The Contractor shall maintain an up-to-date set of Contract Documents (Drawings and Specifications) of all trades on the project site, including Architectural.
- H. It is the responsibility of this Contractor to coordinate the exact required location of floor outlets, floor ducts, floor stub-ups, etc. with Owner and Architect (and receive their written approval) prior to rough-in. Locations indicated in Contract Documents are approximate.
- I. 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.

1.12 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

- A. New Construction:
 - 1. Reference Division 1 - 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:
 - 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. 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 to OCCC 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 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. Additionally, all manufacturers shall provide a statement with their submittal that indicates that their product contains no asbestos or PCB. 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

SECTION 16012 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Requirements for submittals specifically applicable to Division 16 Sections, in addition to Division 1 - General Requirements and any supplemental requirements/conditions.
- B. See Section 16013 - 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 may be submitted in digital PDF format as long as they are organized and named in the following manner:
- B. 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" (Sections 16700 through 16799). Where "SYSTEMS SUBMITTALS" (Sections 16700 through 16799) is not applicable, only one (1) binder is required.
 - 1. Binder is to be adequately sized to comfortably hold required submittals. Minimum spine size to be 1", maximum spine 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, (and if required) "SYSTEMS SUBMITTALS" for Sections 16700 - 16799 submittals.

C. 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 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. Mechanical Shade systems.
 - 6. Long Lead Items
 - 7. 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 (16700) 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 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

PROJECT ADDRESSES

OWNER:

ARCHITECT:

ENGINEER:

Matern Professional Engineering, Inc.
130 Candace Drive
Maitland, Florida 32751
Telephone No.: (407) 740-5020
Fax No.: (407) 740-0365

GENERAL CONTRACTOR:

SUBCONTRACTOR:

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

OCCC WEST CONCOURSE
OPERABLE SHADES REPLACEMENT

MPE NO. 2014-161

ELECTRICAL SUBMITTALS

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

OCCC WEST CONCOURSE
OPERABLE SHADES REPLACEMENT

MPE NO. 2014-161

SYSTEMS SUBMITTALS

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

OCCC WEST
CONCOURSE
OPERABLE
SHADES
REPLACEMENT

MPE NO.2014-161

ELECTRICAL
SUBMITTALS

(Size To 11")

OCCC WEST
CONCOURSE
OPERABLE
SHADES
REPLACEMENT

MPE NO.2014-161

SYSTEMS
SUBMITTALS

(Size To 11")

SECTION 16014 - REFERENCE STANDARDS AND REGULATORY REQUIREMENTS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Reference Standards and Regulatory Requirements specifically applicable to Division 16 sections.

1.3 REFERENCES

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

AASHTO	American Association of State Highway and Transportation Officials
ACA	American Correctional Association
ADA	Americans with Disabilities Act
AHCA	Agency for Health Care Administration
AHERA	Asbestos Hazard Emergency Response Act
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASTM	ASTM International American Society for Testing and Materials International
BOCC	Board of County Commissioners Orange County
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
FS	Florida Statutes

ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers, Inc
LTCR	Local Telephone Company Requirements
NECPA	National Energy Conservation Policy Act
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OCPS	Orange County Public Schools Standards, Guidelines, and Guide Specifications
OSHA	The Occupational Safety and Health Act
SBE	State Board of Education
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.
NEC	National Electrical Code
FAC	Florida Administrative Codes, Chapter 33-8, Rules of the Department of Corrections, County and Municipal Detention Facilities.

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, 2010
 - k) Florida Fire Prevention Code, 2010
 - l) Institute of Electrical and Electronics Engineers

- m) Illumination Engineering Society
- n) Local Power Company Requirements
- o) Lightning Protection Institute
- p) Local Telephone Company Requirements
- q) National Electrical Code, 2008
- r) National Energy Conservation Policy Act
- s) National Electrical Safety Code
- t) National Electrical Manufacturers Association
- u) NFPA 1 Fire Code, 2009
- v) NFPA 101 Life Safety Code, 2009
- w) Occupational Safety and Health Act
- x) Safety Code for Elevators and Escalators
A17.1a, 2008 and A17.1b, 2009 Addenda
- y) Safety Code for Existing Elevators and Escalators
A17.3, 1996
- z) Sheet Metal and Air Conditioning Contractors
- aa) Underwriters Laboratories, Inc.
- bb) 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 16015 - ELECTRICAL SYMBOLS AND ABBREVIATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Symbols and abbreviations specifically applicable to all Division 16 sections in addition to those in Division 1 - 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
 - AC 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
 - CB Circuit Breaker
 - CBM Certified Ballast Manufacturers
 - CCTV Closed Circuit Television
 - cd Candela
 - CFM Cubic Feet per Minute
 - CH Chiller
 - CKT Circuit
 - CKT BRKR Circuit Breaker
 - C/L Center Line

Clg Ceiling
Comp Compressor
Conn Connection
Cond Condenser
Cont Continuous
CRI Color Rendering Index
CT Current Transformer
CU Copper
CU Compressor Condenser Unit
CW Cold Water
DB Direct Burial
DC Direct Current
Disc Disconnect
DN Down
DPST Double Pole Single Throw
DWG Drawing
EC 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
FC 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
HS Heat Strip
ICTC Intercom Termination Cabinet
IMC Intermediate Metallic Conduit
Incand Incandescent
in Inches
JB Junction Box
kVA KiloVolt Ampere

kW Kilowatts
kWH Kilowatt Hour
K Kelvin
LLD Lamp Lumen Depreciation
LED Light Emitting Diode
LIU Light Interface Unit (Fiber Optic Patch Panel)
LT Light
LTG Lighting
LTS Lights
LPF Low Power Factor
MCB Main Circuit Breaker
MLO 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
NPT National Pipe Thread
NF Non Fused
NC Normally Closed
NO Normally Open
NIC Not in Contract
No. Number
OB Outlet Box
OD Outside Diameter
OL Overload
OLS Overloads
% Percent
Ø Phase
P Pole
PL Compact Fluorescent Lamp
PT 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
RS Rapid Start
SCA Short Circuit Amps
Sec Secondary

SHT Sheet
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
TV Television
TYP Typical
Temp. Temperature
UL Underwriters' Laboratories
UTP Unshielded Twisted Pair
VFD Variable Frequency Drive
VHF Very High Frequency
VHO Very High Output
V Volt
VA Volt Amperes
Vol. Volume
W Wire
W.P. Weatherproof
XFMR Transformer
Y Wye
Yd Yard
Yr Year
3R Rainproof
4X Stainless Steel Dusttight, Watertight

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 16060 - MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the requirements for electrical demolition.
- B. Provide and install all equipment, labor, material, accessories, and mounting hardware for completion of 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.

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. 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.

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. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Seal openings in walls, floors, etc. and fire stop in accordance with the accepted UL detail to

maintain integrity of assembly.

- H. 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.
- I. 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

SECTION 16061 - INVESTIGATION OF EXISTING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes testing and documentation of existing electrical systems.

1.3 REFERENCES

- A. IEEE Recommended Practices

1.4 DESCRIPTION

- A. Test the essential features of the following existing electrical systems:
 - 1. Controls and alarms.
 - 2. Outlets: Convenience.
 - 3. Switches: Regular, time.
 - 4. Building grounding systems.
- 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.

1.5 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. Ground System:
 - a) Test ground system at each point of circuits being reused.
- 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 16095 Demonstration of Completed Electrical Systems.

3.2 INVESTIGATION/TESTING FORMS

- A. Submit Existing Facilities Investigation Form and advise Owner/Engineer of all deficiencies in

system(s) prior to work. All systems will be assumed to be fully operational if Form not received by Engineer prior to work on system.

- B. Submit five copies of the 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 16061 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 _____

SECTION 16095 - DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. 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. Miscellaneous Electrical Equipment
 - a) Electrical systems controls and equipment
 - b) Electrical power equipment
 - c) Motor control devices
 - d) Surge suppression equipment

- 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 testing 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 Check Out Memo form for each item, equipment, and system. Copy to be included in each Operation and Maintenance Manual.

END OF SECTION

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)**

SECTION 16111 - CONDUIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 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. Aluminum Rigid Metallic Conduit (RMC) NEC 344
 - 3. Intermediate Metal Conduit (IMC) NEC 342
 - 4. Flexible Metal Conduit (FMC) NEC 348
 - 5. Liquidtight Flexible Metal Conduit (LFMC) NEC 350
 - 6. Electrical Metallic Tubing (EMT) NEC 358
 - 7. Rigid Polyvinyl Chloride Conduit (Type PVC) NEC 352
 - 8. Fittings and Conduit Bodies

1.3 REFERENCES

- A. ANSI C80.1 Electrical Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 Steel 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
- F. NEMA RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- G. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Conduit (EPC 40, EPC 80)
- H. NEMA TC 3 Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

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.
- 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.
- 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. Homeruns: 3/4" C.
- B. Underground Branches: 3/4".
- C. Aboveground Branches: 1/2".
- D. Flexible and seal-tite metallic conduit 1/2" C (maximum 6' long).

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.

2.4 FLEXIBLE METAL CONDUIT

A. Comply with:

1. NEC 348.
2. ANSI/UL 1.

B. Conduit material: 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.

2.5 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.

2.6 ELECTRICAL METALLIC TUBING

A. Comply with:

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.

2.7 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. NEMA TC 3.
 - 2. UL 514.
- D. General:
 - 1. Shall be UL listed and identified.
 - 2. Shall conform to all national, state and local codes.
 - 3. Manufacturer shall have five years experience in manufacturing PVC conduits.

2.8 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. 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.
- B. 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.
- C. Outdoor Location:
 - 1. Above Grade:
 - a) Where penetrating the finished grade, black mastic coated or PVC coated galvanized rigid steel conduit shall be used.
 - b) Electrical metallic tubing (thin wall) is permitted under roof, overhangs, etc. provided it is not subjected to physical damage and is not in direct contact or directly subject to exterior elements including sunlight.
 - c) Exterior conduits not on roof and not subject to damage (i.e. 6' above grade/floor or higher) may be rigid non-metallic PVC conduit as specified elsewhere. (Schedule 40

for low voltage Class II wiring, Schedule 80 for power wiring.)

- d) Exterior conduits from grade level to 6' above grade may be rigid non-metallic Schedule 40 PVC for low voltage Class II wiring provided rigid metal conduit is used at transition from below grade to 12" above grade (due to weed eater damage, etc.).

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.

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 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 16190 Hangers and Supports.
- 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.

3.7 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 accordance 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.

3.10 GENERAL

- 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 pipe cutter; 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. Grounding and bonding of conduit under provisions of Section 16170 Grounding and Bonding .
- Q. Identify conduit under provisions of Section 16195 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. 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 flashing or boot. 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

SECTION 16123 - BUILDING WIRE AND CABLE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. 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. NEC 330
- C. 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

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 C. Remove incorrect insulation types in new work.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 16195 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 16090 Tests and Performance Verification of Electrical System.
- 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 A/E. 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.
- F. Where communications type conductors are installed, special requirements shall apply as outlined under that specific system detail specifications.

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. Install circuit conductors in conduit.
- D. 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 A/E to match existing, color-code shall be as follows:

Neutrals: 120/208V system white; 277/480V system natural gray
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 noted 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 or 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

SECTION 16131 - OUTLET BOXES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes wall and ceiling outlet boxes (and/or small junction/pullboxes).
- B. Provide and install all outlet boxes (flush or surface) complete with all accessories as required to facilitate installation of electrical system and as required by the NEC.

1.3 REFERENCES

- A. ANSI/NEMA FB 1 Fittings Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- B. ANSI/NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- C. ANSI/NFPA 70 National Electrical Code
- D. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

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. Surface cast boxes.
- B. For pullboxes and junction boxes not covered in Section 16133 Pull and Junction Boxes, submit product data showing dimensions, covers, and construction.

1.6 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of outlets in offices and work areas prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All boxes and fittings shall be labeled by Underwriters Laboratories.
- B. Provide box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, outlet boxes, and corrosion-resistant knockout closures compatible with outlet boxes being used and meeting requirements of individual wiring situations.
- C. All boxes shall be of the size and shape required by NFPA 70 for their respective locations.
- D. Boxes shall be of such form and dimensions as to be adapted to the specific use and location, type of device or fixtures to be used, and number and size of conductors and arrangement, size

and number of conduits connecting thereto.

- E. Handy boxes shall not be used.
- F. Outlet boxes to be one-piece.
- G. 4" x 4" boxes and 4 11/16" x 4 11/16" boxes used as junction boxes shall be one piece.

2.2 SHEET METAL OUTLET BOXES ANSI/NEMA OS 1, GALVANIZED STEEL:

- A. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2" male fixture studs where required.
- B. Concrete Ceiling Boxes: Concrete type.
- C. Interior flush outlet boxes shall be galvanized steel constructed with stamped knockouts in back and sides, and threaded holes with screws for securing box coverplates or wiring devices. T&B, Steel City, Raco or accepted substitution.
- D. Ceiling outlet boxes shall be 4" octagonal or 4" square X 1-1/2" deep or larger as required for number and size of conductors and arrangement, size and number of conduits terminating at them.
- E. Switch, wall receptacle, telephone and other recessed wall outlet boxes in drywall shall be 4" square X 1-1/2" deep. For recessing in exposed masonry, provide one piece 4" square x 1-1/2" deep wall boxes with appropriate 4" square cut tile wall covers Steel City series #52-C-49/52-C-52 or accepted substitution. For recessing in furred-out block walls, provide 4" square box with required extension for block depth and required extension for drywall depth.

2.3 CAST BOXES NEMA FB 1:

- A. Interior surface outlet boxes and conduit bodies installed from 0" AFF to 90" AFF (including fire alarm device backbox) shall be the heavy cast aluminum or iron with external threaded hubs for power devices and threaded parts for low voltage devices; Appleton, Crouse Hinds or accepted substitution. Trim rings shall also be of one-piece construction.
- B. Weatherproof outlet boxes shall be constructed of corrosion-resistant cast metal suited to each application and having threaded conduit hubs, cast metal faceplate with spring-hinged waterproof cap suitably configured, gasket, and corrosion-proof fasteners.
- C. Boxes to be Type FD unless otherwise noted on drawings.
- D. Freestanding cast boxes are to be type FSU (with flange). Other cast zinc boxes are not acceptable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6" from ceiling access panel or from removable recessed luminaire.
- D. Install boxes to preserve fire resistance rating of partitions and other elements.
- E. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- F. Use flush mounting outlet boxes in finished areas.
- G. Do not install flush mounting boxes back-to-back in walls; provide minimum 6" separation.

- Provide minimum 24" separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
 - I. Use stamped steel bridges to fasten flush mounting outlet box between studs.
 - J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
 - K. Support all outlet boxes from structure with minimum of one 3/8" all-thread rod hangers. Boxes larger than 25 square inches shall be supported with two all-thread rod hangers, minimum.
 - L. Do not fasten boxes to ceiling support wires.
 - M. Support boxes independently of conduit.
 - N. Use gang box where more than one device is mounted together. Do not use sectional box.
 - O. Use gang box with plaster ring for single device outlets.
 - P. Use cast outlet box in exterior locations and wet locations.
 - Q. Comply with applicable portions of the NECA National Electrical Installation Standards.
 - R. Install outlets in the locations shown on the drawings; however prior to rough-in, the Owner shall have the right to make slight changes in locations to reflect room furniture layouts.
 - S. The Contractor shall coordinate his work with that of the General Contractor so that each electrical box is the type suitable for the wall or ceiling construction provided and suitable fireproofing is inbuilt into fire rated walls.
 - T. The Contractor shall relocate electrical boxes as required so that once installed, electrical devices will be symmetrically located with respect to the room layout.
 - U. All boxes shall be installed in a flush rigid manner with box lines at perpendicular and parallel angles to finished surfaces. Boxes shall be supported by appropriate hardware selected for the type of surface from which the box shall be supported. For example, provide metal screws for metal, wood screws for wood, and expansion devices for masonry or concrete.
 - V. For locations exposed to weather or moisture (interior or exterior), provide weatherproof boxes and accessories.
 - W. As a minimum, provide pull boxes in all raceways over 150'. The pull box shall be located near the midpoint of the raceway length.
 - X. Provide knockout closures to cap unused knockout holes where blanks have been removed, and plugs for unused threaded hubs.
 - Y. Provide conduit locknuts and bushings of the type and size to suit each respective use and installation.
 - Z. Boxes and conduit bodies shall be located so that all electrical wiring is accessible.
 - AA. Avoid using round boxes where conduit must enter box through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.
 - BB. All flush outlets shall be mounted so that covers and plates will finish flush with finished surfaces without the use of shims, mats or other devices not submitted or accepted for the purpose. Add-a-Depth rings or switch box extension rings (Steel City #SBEX) are not acceptable. Plates shall not support wiring devices. Gang switches with common plate where two or more are indicated in the same location. Wall-mounted devices of different systems (switches, thermostats, etc.) shall be coordinated for symmetry when located near each other on the same wall. Outlets on each side of walls shall have separate boxes. Through-wall type boxes shall not be permitted. Back-to-back mounting shall not be permitted. Trim rings shall be extended to within 1/8" of

finish wall surface.

- CC. Outlet boxes mounted in metal stud walls are to be supported to studs with two screws inside of outlet box to a horizontal stud brace between vertical studs or one side of outlet box supported to stud with opposite side mounted to section of stud or device to prevent movement of outlet box after wall is finished.
- DD. All outlet boxes that do not receive devices in this Contract are to have blank plates installed matching wiring device plates.
- EE. Outlets in Fire/Smoke and Smoke Partitions/Walls:
 - 1. Electrical outlet boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearances between such outlet boxes and the gypsum board must be completely filled with joint compound or other accepted materials. The wall must be built around outlets of larger size so as not to interfere with the integrity of the wall rating.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of outlet box for products furnished under all Sections of these Specifications.
- B. Coordinate locations and sizes of required access doors with applicable Sections in these Specifications.
- C. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- D. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.
- E. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

3.3 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closure in unused box opening.

END OF SECTION

SECTION 16133 - PULL AND JUNCTION BOXES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide and install pull and junction boxes as shown on Drawings or as required by the NEC.
- B. Provide and install pull and junction boxes wherever required for a complete and operating distribution system whether shown on Drawings or not.
- C. Where outlet boxes are used for pull and/or junction boxes, they shall meet the requirements of Section 16131 Outlet Boxes.

1.3 REFERENCES

- A. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- B. ANSI/NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- C. ANSI/NEMA OS 2 Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
- D. ANSI/NFPA 70 National Electrical Code
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

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 actual shop drawings on all pull boxes showing.
 - 1. Covers.
 - 2. Dimensions - inside and out.
 - 3. Rating of concrete or gauge of metal.
 - 4. Manufacturer.

1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations and mounting heights of pull and junction boxes.

1.7 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of pull and junction boxes prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose and to maintain required access.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Dimensions of pull and junction boxes shall meet dimensions shown on Drawings or dimensions required by NEC, whichever is largest.
- B. Pull and junction boxes shall meet all requirements of UL and NEC.
- C. Small pull boxes (i.e. 4" x 4") shall meet the requirements of these Specifications for outlet boxes as a minimum.
- D. All boxes (above ground) of 100 cubic inches or more shall be constructed of 14 gauge steel with hot dip galvanized coating.

2.2 SHEET METAL BOXES

- A. NEMA OS 1, galvanized steel.
- B. Box to be fully weatherproof and watertight where installed outside.

PART 3- EXECUTION

3.1 GENERAL

- A. Install per NEC
- B. Install electrical boxes as shown on Drawings and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6" from ceiling access panel or from removable recessed luminaire.
- F. Install boxes to preserve fire resistance rating of partitions and other elements.
- G. Align adjacent wall-mounted boxes with each other.
- H. Use flush mounting boxes in finished areas.
- I. Do not install flush mounting boxes back-to-back in walls; provide minimum 6" separation. Provide minimum 24" separation in acoustic rated walls.
- J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- L. Pull and junction boxes larger than 25 square inches shall be supported with two 3/8" all-thread rod hangers minimum.
- M. Install all labels and identification as required by the NEC and applicable sections of these Specifications.
- N. Pull and junction boxes used for systems (Sections 16700-16799) larger than 25 square inches shall be hinged cover type.
- O. Do not fasten boxes to ceiling support wires.
- P. Support boxes independently of conduit.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations and sizes of required access doors with applicable sections in these Specifications.
- B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

3.3 ADJUSTING

- A. Install knockout closure in unused box opening.

END OF SECTION

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SECTION 16141 - WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 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. 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. 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. 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 Certification receipt. (See Section 16098 Operation and Maintenance Manuals).

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, 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.

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. 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 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. Where so directed by the A/E (either by Contract Documents or direction after the bid) substitute

nylon plates of quality as specified below, without increase in Contract Price. Coordinate prior to securing plates for project. Where nylon cover plates are required in finished interior spaces, these shall be fabricated of either non-combustible mar-proof high impact resistant fiberglass or nylon reinforced thermosetting material or nylon, having a minimum thickness of .10", with smooth finish. Screws securing the plates shall have flush (when installed) heads of color to match plates. Nylon cover plates shall conform to Federal Specification QP-455A and all other NEC, UL and NEMA requirements. Where required by A/E nylon plates shall be fitted with nylon screws for totally nonmetallic surface installation.

- D. Cover plates for switches located in corrosive atmospheres (where vaporproof is not indicated) shall be equal to Hubbell #17CM81/#17CM82/#17CM83/#17CM84 one piece neoprene with matching presswitch.
- E. Cover plates for exterior receptacles shall be gasketed covers with hinge allowing plug and cord to be plugged in and activated with cover closed..
- F. 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.
- G. Unless specifically noted otherwise in Specifications or on Drawings, all outlets for telephone and other communications and data systems shall be provided with standard size one-piece cover plates having a minimum 3/4" diameter bushed hole in the center unless specifically noted otherwise in Specifications and/or on Drawings. Where telephone conductors are installed, plates shall contain telephone type, polarized plug-in receptacles.
- H. All device plates (including systems device plates and trims) located in secure areas such as cells, dayrooms, holding rooms, recreation areas, etc., shall have security wall plates (minimum 10 gauge) with minimum 12 gauge galvanized steel backplate. Plates shall have TORX counter pin reject type tamperproof screws.
- I. All device plates (including systems device plates and trims) and blank plates located in all secure areas shall be mounted with tamper proof screws, unless otherwise noted.

PART 3- EXECUTION

3.1 EXAMINATION

- A. Verify conditions under provisions of Division 1 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.
- 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 galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets. Paint to match walls.
- S. Install protective rings and split nozzle on active flush cover service fittings.
- T. Install local room area wall switches at door locations on the lock side of the door approximately four inches 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 16170 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including Division 1 Specification Section, 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 rods and couplings.
 - 2. Mechanical connectors.
 - 3. Ground wells.
 - 4. Ground bus bars and associated components.
 - 5. Ground ring conductor.

6. Counterpoise conductor.
 7. Exothermic welding materials and molds.
 8. 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

- A. Submit record documents to accurately record actual locations of grounding electrodes.
- B. Submit test results of each ground rod. See Section 16090 Tests and Performance Verification of Electrical System.

PART 2- PRODUCTS

2.1 MECHANICAL CONNECTORS

- A. All grounding connectors shall be in accordance with UL 467 and UL listed for use with rods, conductors, reinforcing bars, etc., as appropriate.
- B. Connectors and devices used in the grounding systems shall be fabricated of copper or bronze materials, and properly applied for their intended use. Specified items of designated manufacturers indicate required criteria. Equal products may be provided if approved. All connectors and devices shall be compatible with the surfaces being bonded and shall not cause galvanic corrosion by dissimilar metals. Materials in items not listed herein shall be of equal quality to the following specified items:
 1. Lugs: Substantial construction, of cast copper or cast bronze, with "ground" (micro-flat) surfaces, twin clamp, two-hole tongue, equal to Burndy QQA Series or T&B equal. Lightweight and "competitive" devices shall be rejected.
 2. Grounding and Bonding Bushings: Malleable iron, Thomas and Betts (T&B), or equal.
 3. Grounding Screw and Pigtail: Raco No. 983 or equal.
 4. Building Structural Steel, Existing: Thompson 701 Series heavy duty bronze "C" clamp with two-bolt vise-grip cable clamp.
- C. Mechanical lugs or wire terminals shall be used to bond ground wires together or to junction boxes and panel cabinets and shall be manufactured by Anderson, Buchanan, Thomas and Betts Co., or Burndy.

2.2 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 HAZARDOUS LOCATIONS

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

3.3 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 so installed as to permit 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.
- 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.

3.4 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.

3.5 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 16090 Test and Performance Verification.
- D. Ground rod resistance test results shall be submitted to Engineer and Building Department prior to Substantial Completion. A test report certified by the Contractor shall be submitted as a close-out document for the project.

3.6 INTERFACE WITH OTHER PRODUCTS

- A. Interface with site grounding system.
- B. Interface with lightning protection system installed under Section 16671 Lightning Protection System.
- C. Interface with communications system installed under 16700 series specification sections.

3.7 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

SECTION 16190 - HANGERS AND SUPPORTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 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.

- 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

SECTION 16195 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 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 conduits, 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, Inc. 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. For 277/480 Volt System:
 - a) Orange with white letters.
 - b) Brown 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 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 Sections 16700 through 16799), 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
Normal Power 277/480 volt	Leather Brown K02501
Normal Power 120/208 volt	Glossy Black K01601
Grounding	Fluorescent Green K03106

B. Conduit (not subject to public view) longer than 20' shall be painted with above color paint band 20 ft. on center. Paint band shall be 4" in length, applied around entire conduit. Where conduit is 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 (areas that can be seen by the public) shall be painted to match surface to which it is attached. Provide written request to A/E for interpretation of those public areas which may be 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.

2.5 UNDERGROUND WARNING TAPE

- A. Description: Minimum 6" wide plastic tape, detectable type, with suitable warning legend describing buried lines. Systems conduits shall have orange colored tape. Power/lighting conduits shall have red colored tape.

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 16441 - ENCLOSED DISCONNECT SWITCHES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Provide all labor, materials, and equipment necessary to properly install switches as shown on the Drawings and as required by codes.
- B. Coordinate with Division 15 Contractor and Specifications as to who is to provide disconnect switches for mechanical equipment. Provide all disconnect switches not being provided by Division 15 Contractor.

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, 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 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.
- G. Coordinate all requirements for controls between variable speed drive units and its respective motor with drive specification, manufacturer, provider and installer. Provide auxiliary contacts, relays, etc. as required.

- H. Install all labels and identification as required by the NEC and applicable sections of these specifications.

END OF SECTION

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